

Regenerative Medicine: where their origin makes species meet

Medicina Regenerativa: donde su origen hace que las especies se encuentren

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Abstract

The articular cartilage of joints serves diverse functions, including absorbing shock, transmitting force, and enabling low-friction joint motion. Regeneration of articular cartilage defects remains, however, a significant challenge in both human and veterinary orthopaedic practice. *Ex vivo* and *in vivo* models play a crucial role in translating novel potential regenerative treatments from bench to bedside. However, in view of the predictive power of these models and the One Medicine concept that proclaim that there should be no dividing lines between human and animal medicine to learn, it is important to understand the similarities as well as differences in the cartilage tissue between species. To this aim, osteochondral cores of the femoral condyles were studied in 58 different mammalian species ranging from mouse to elephant. Interestingly, while biochemical composition remained relatively constant, cartilage thickness and cellularity were similar underscoring the importance of the equine species as a model for human orthopaedic interventions.

Nevertheless, political ambition and societal pressure are now asking for a drastically reduction of animal experimentation and have further spiked the development of more predictive *in vitro* and *ex vivo* models. In addition to a range of more sophisticated *in vitro* assays, this has now also provided an *ex vivo* osteochondral defect model that can be generated based on equine donor tissue. Although such models better represent the situation in the native tissue and can be used to assess (osteo)chondral repair strategies, they still lack some important aspects of the *in vivo* (patho)physiological (inflammatory) environment, as well as the exposure to mechanical loading. This illustrates the challenges that we still face in translating these novel approaches from bench to bedside.

References

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