

Disc Degeneration Animal Models

Degeneration of intervertebral discs (IVD) is one main cause of back pain and can also lead to other complications such as disc herniation, spinal stenosis and degenerative spondylolisthesis. Although IVD degeneration presents similar features as natural aging, IVD degeneration is present in all classes of age in the adult population. The etiology and development of IVD degeneration is poorly understood and may involve complex interactions of genetic, biological and mechanical factors.

In complement to *in vitro* and *ex-vivo* models, small and large animal models offer a physiological model to study IVD repair, where the mechanical and biochemical environment of the IVD is preserved. However, these animal models do not accurately picture human IVD biology. Animal models of IVD degeneration present specific features, such as better nutrient and metabolite transport, the presence of notochordal cells within the mature IVD core and quadruped spine load, account for a facilitated IVD repair process in these animal models.

In spite of these limitations, small and large animal models of IVD degeneration are of great value for studying the progression of the disease and for validating the safety and the efficacy of novel therapeutic treatments.

Reproducibility, progression and severity of the induced degeneration vary according to the nature of the injury and to the animal species. IVD degeneration can be created by using chemical (papain), physical (nucleus puncture, annulus fibrosus stab) or mechanical injury to the IVD. Repair of the IVD can be assessed using *in vivo* and *ex-vivo* imaging, immunohistology, biochemical and molecular analyses and biomechanical testing.

Species available:

- Rabbit
- Mouse
- Rat
- Dog
- Goat and Sheep
- Pig

