Intervertebral disc is the largest avascular tissue in human body with resident cells experiencing a uniquely hypoxic and osmotic niche. Intervertebral disc degeneration is a ubiquitous pathological condition and is associated with chronic low back and neck pain resulting in a substantial burden on healthcare systems and the individuals. Despite multifactorial nature of the pathology, a few attempts have been made to understand the diversity of clinically relevant disease phenotypes. This lecture will discuss recent studies of a number of in-bred murine models underscoring the importance of the mouse as an animal model of choice for the assessment of intervertebral disc pathobiology and diversity of disease phenotypes.