

## ***The Pathomechanics of Degenerative Joint Disease: A One Health Comparative Case Study Approach***

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### ***1. Indicate which component(s) of the One Health Framework you intend to address.***

- Environmental health
  - External exposures including air, food, and water, and the influence of the built and natural environment on health and disease impact of humans on the ecosystem and the potential to produce disease as well as control disease
- Human-animal interaction
  - Animal-centered industries

### ***2. Identify the student audience(s) that could benefit from your case study***

- Clinical students, including veterinary and medical students; orthopedic specialists; physiotherapists
- These cases studies are being developed by a veterinary pathologist, a functional and comparative vertebrate anatomist and a human musculoskeletal specialist and could be used in the training of medical and veterinary students, as well as in the continued education of existing clinicians and practitioners.

### ***3. Provide a synopsis of 250 words or less summarizing the intended case study***

The most common disease affecting man and animals is degenerative joint disease (DJD, osteoarthritis). Pathomechanical forces are induced by how an individual structurally interacts with its environment and directly cause joint injury. Therapeutics based upon identification of the sources of mechanical stress are critically needed as treatments focused only on controlling pain and tissue pathology mostly fail to prevent disease progression. Static postural analysis (SPA) is a well-established technique requiring no specialized equipment that can be used to identify the pathomechanical causes of joint pain and damage. It is a physics-based functional anatomical approach that can also explain why a particular joint is painful even when lesions are not visible. To perform SPA, free-body diagrams are used to analyze the normal and pathomechanical forces and torques acting on an individual in various static and freeze action postures. For this case study, comparative SPA analyses of the common forms of DJD in humans, horses and dogs will be performed. 2D models will be used to highlight vulnerabilities that are both shared and unique between humans and animals. This type of functional analysis illustrates why a patient has DJD, and can be used by practitioners to educate clients and formulate individualized therapies. The comparative approach emphasizes that the causal relationship between pathomechanical forces and DJD is based upon the same principles across species, allows a better understanding of the shared susceptibility to a very common disease and facilitates the transfer of therapeutic approaches between human and veterinary medicine.