

Biomarkers of lameness in dairy animals: the challenge of translating information from *in vitro* systems

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Biomarkers are anatomic, physiologic, biochemical, or molecular parameters that may be associated with the presence and severity of a specific disease. They are detectable and quantified using a variety of methods, including physical examination, laboratory assays, and imaging and can be used as indicators of pharmacologic responses to therapeutic interventions. The second DairyCare Conference focuses on the Health, Welfare and the Lameness/Reproduction interface in dairy animals. A topic that is of interest to members of this COST Action is the use of biomarkers to detect and assess health/welfare problems, including lameness. This presentation will provide an overview of the pathophysiological changes that occur in inflammatory and degenerative diseases of joints (i.e. osteoarthritis (OA), rheumatoid arthritis (RA) and ankylosing spondylitis (AS)) before discussing the role of biomarkers in the diagnosis, monitoring and treatment of these diseases. Biomarkers are having a significant impact on early detection and treatment in RA. However, there are currently no reliable, quantifiable and easily measured biomarkers that provide an earlier diagnosis of OA, especially during the asymptomatic and pre-radiographic stages of the disease. The current 'gold standard' for the detection of cartilage loss in human and veterinary patients with OA is radiography. Cartilage damage in OA is detected by measuring decreases in joint space width (JSW) on radiographs of patients with progressive disease. However, substantial cartilage loss must occur before any decreases in JSW can be observed. Unfortunately, by this stage significant and irreversible cartilage loss has occurred. Consequently, we need sensitive biochemical markers that can facilitate early and accurate diagnosis joint disease before the appearance of radiographic changes. This talk will provide an overview of our EU consortium's work on OA biomarkers and focus on how joint and inflammation-related biomarkers might be used to diagnose lameness in dairy animals. The availability of biomarker tools and reagents will always be a major bottleneck in the biomarker pipeline, with drastic consequences for the development of disease-modifying OA treatments. It is hoped that the presentation will lead to an open discussion about the potential for developing rapid, sensitive and affordable and biomarker assays for hoof lameness in dairy animals.

Acknowledgements

This article is based upon work from COST Action FA1308 DairyCare, supported by COST (European Cooperation in Science and Technology, www.cost.eu). COST is a funding agency for research and innovation networks. COST Actions help connect research initiatives across Europe and enable scientists to grow their ideas by sharing them with their peers. This boosts their research, career and innovation.