

The Roles of Adipose tissue and Adipokines in Canine Cranial Cruciate Ligament Rupture

Wipawee Saengsoi, Simon R. Tew, Chen Bing, Eithne J. Comerford, Alexander J. German

Department of Musculoskeletal Biology, Institute of Aging and Chronic disease and School of Veterinary Science, University of Liverpool

BACKGROUND

What is the cranial cruciate ligament?

- The **cranial cruciate ligament (CCL)** in canine is the same as the anterior cruciate ligament (ACL) in humans. It's located in the knee, connecting the tibia and the femur.
- CCL rupture is one of the most important causes of hindlimb lameness in dogs which can contribute to osteoarthritis. It has important consequences in terms of morbidity and cost associated with its management (fig.1).



What are adipokines?

- Adipokines are biologically active mediators released from white adipose tissue of fat, which can result in inflammation and increased breakdown of body tissues.
- Adipokines are including of proteins such as interleukin-6 (IL-6), adiponectin, leptin and visfatin.
- A number of studies have demonstrated that obesity is associated with joint disease in man and dogs. Also adipokines may provide a potential link between those (fig.2).

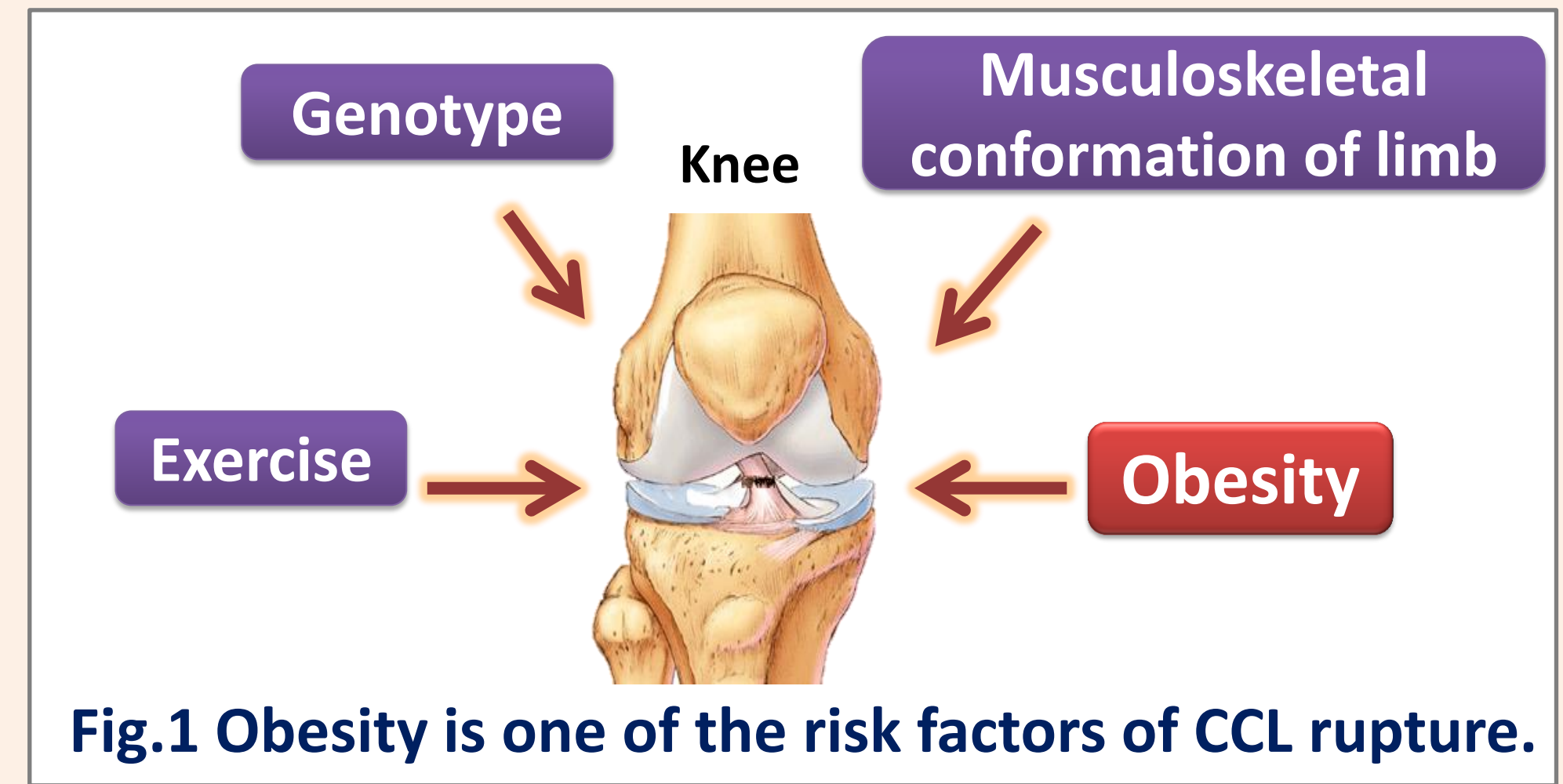


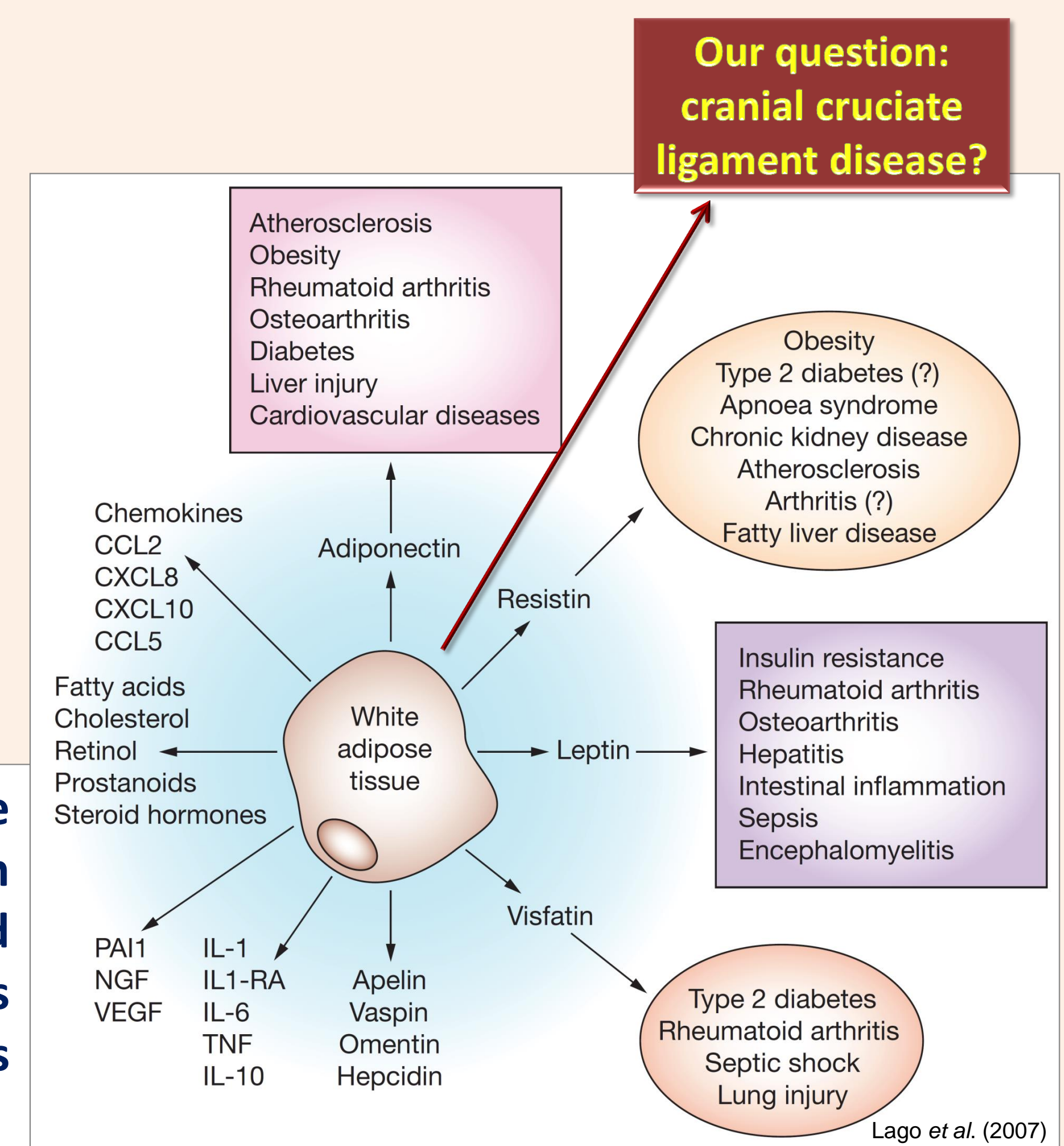
Fig.1 Obesity is one of the risk factors of CCL rupture.

AIMS OF THIS STUDY

1. To determine the relationship between adipokines with cartilage degradation biomarkers and clinical measures in cruciate ruptured dogs
2. To study the effect of adipokines and fat on cranial cruciate ligament.

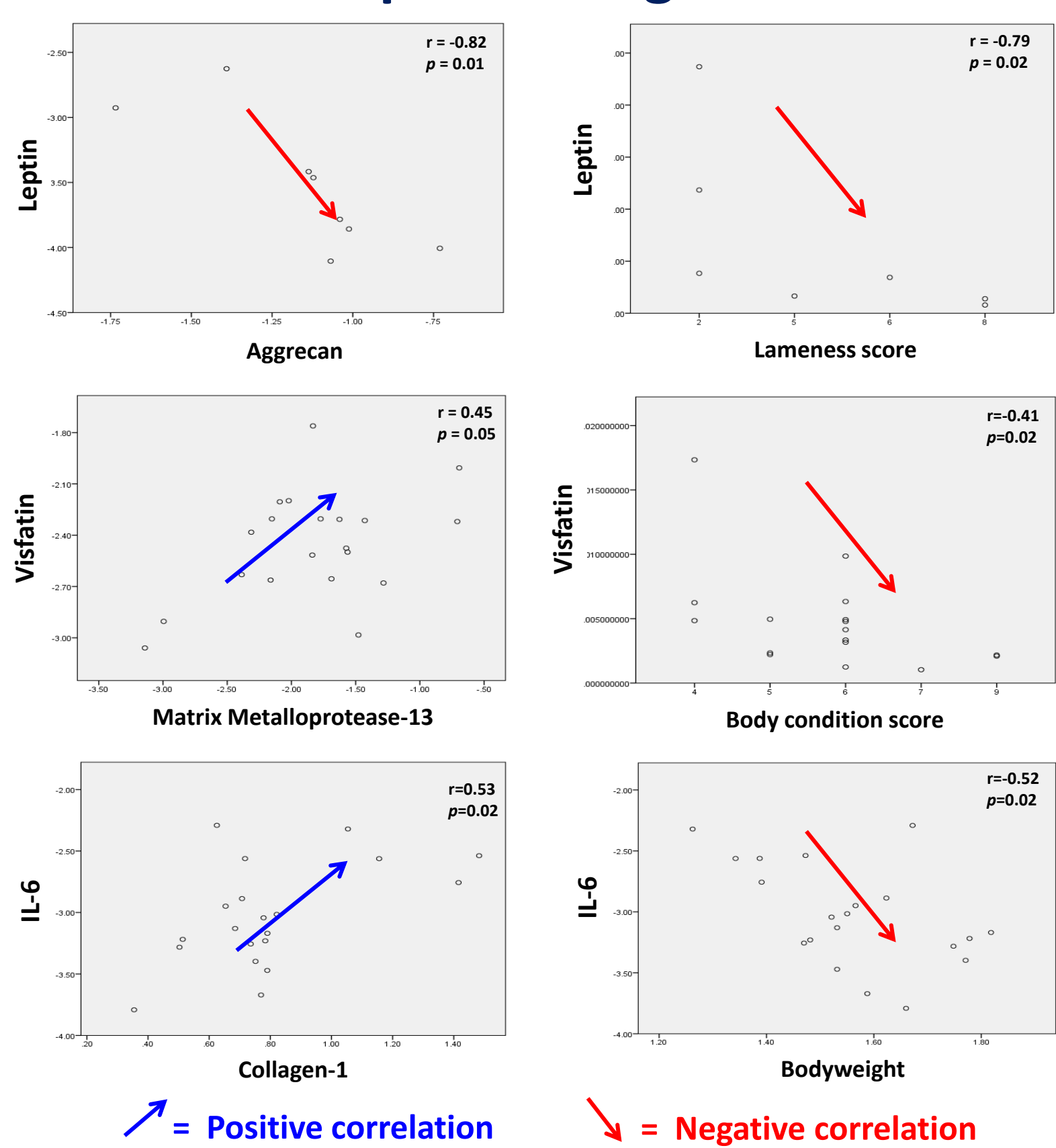
Hypothesis: Both systemic and local (intra-articular) cross-talk occurs between canine adipokines and articular tissue, and these mechanisms can play a role in the pathophysiology of CCL disease.

Fig.2 There are links between adipokines and health problems from previous researches.



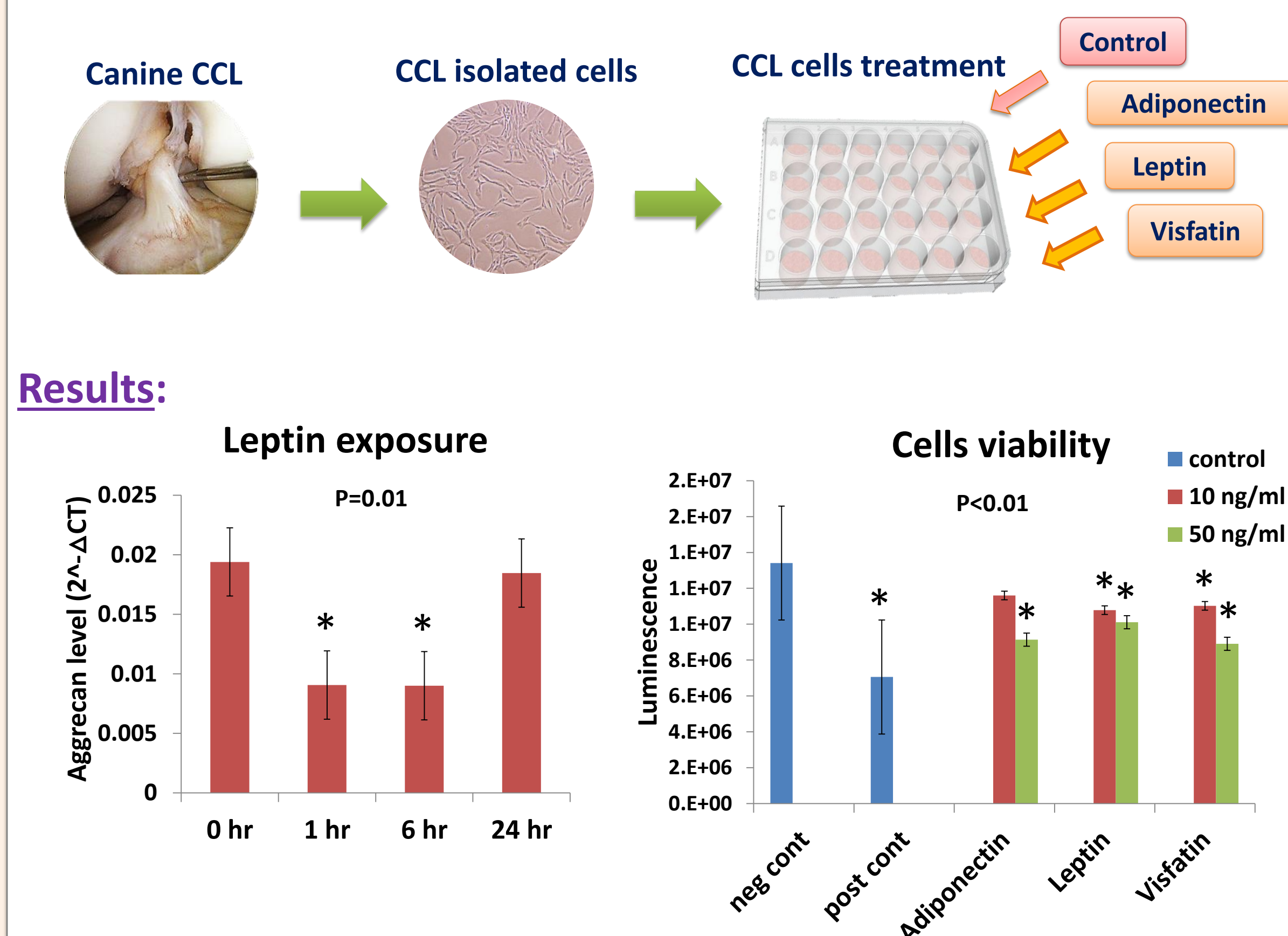
METHODS & RESULTS

1. Adipokines in CCLs correlated with markers of cartilage damage and clinical measures including weight, body condition score and severity of lameness in CCL ruptured dogs.



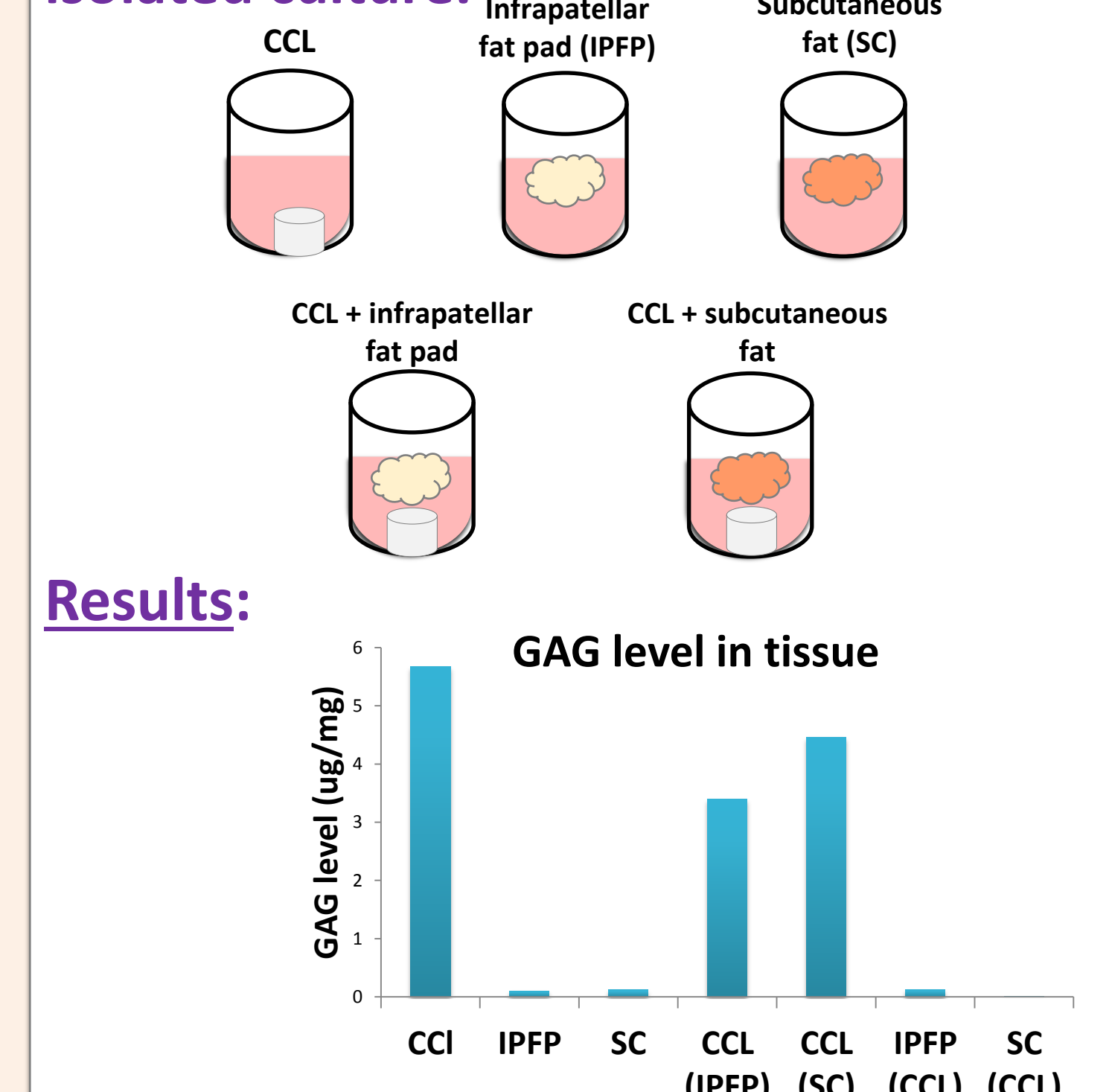
2. Adipokines may decrease the health of ligament cells.

Method: CCLs cell isolated from dogs were treated with adipokines (adiponectin, leptin and visfatin) in different concentration and time.



3. Adipose tissue may decrease production of glycosaminoglycans (GAGs) in CCLs.

Method: Co-culture of CCLs with different sources of fat compared with isolated culture.



DISCUSSION & CONCLUSION

- We have identified associations between adipokines and cartilage degradation biomarkers, together with some clinical measures of CCL ruptured dogs.
- Leptin, which is an indicator for obesity, tend to have a negative effect on aggrecan which have major structural roles in ligaments.
- Those key adipokines may cause cells death in dose-dependent manner.
- Factors secreted by adipose tissue may reduce GAGs production in ligament explant through the co-culture.
- These results may suggest link between obesity and cruciate ligament rupture in dogs.
- Further studies on this association should be revealed by recruiting more samples and perform additional experiments.