

## Introduction

- Developmental dysplasia of the hip (DDH) is a congenital hip alteration that changes the “ball in socket” movement of the leg inside the pelvis.
- Genome-wide association studies have identified CX3CR1 polymorphisms associated with increased risk of Developmental Dysplasia of the Hip.
- Mouse models of CX3CR1 knock-out (KO) mice show unilateral, bony discrepancies between the femur head and acetabulum in comparison to wild-type (WT) mice, as well as gait impairment similar to that of humans with osteoarthritis (which develops in DDH patients later in life).

## Aims and Objectives

**Aim I:** Assess joint congruity in a CX3CR1 KO model of unilateral developmental dysplasia of the hip and control populations via microcomputed tomography.

**Aim II:** Evaluate bone and joint characteristics in CX3CR1 KO model of unilateral developmental dysplasia of the hip and control populations via microcomputed tomography.

## Methods

- 42 mice total (19 wild-type offspring; 23 CX3CR1 -/- offspring)
- Whole body and hip-focused microCT scans using a Viva80-CT (Scanco USA) performed with a resolution of 15 micron (isotropic voxel size) (Figure 1).
- Joint congruity assessed using contralateral limbs from wild-type controls to create an “average atlas” of normal mouse joint morphology.
- This average atlas will be used to quantify the difference in Cervico-diaphyseal angle (CDA) in CX3CR1 knock-out vs wild-type mice via MatLab application.



**Figure 1.** Representative axial cut through hips and lumbar spine of a CX3CR1 knock-out mouse. The left hip demonstrates a characteristic dysplastic acetabulum.

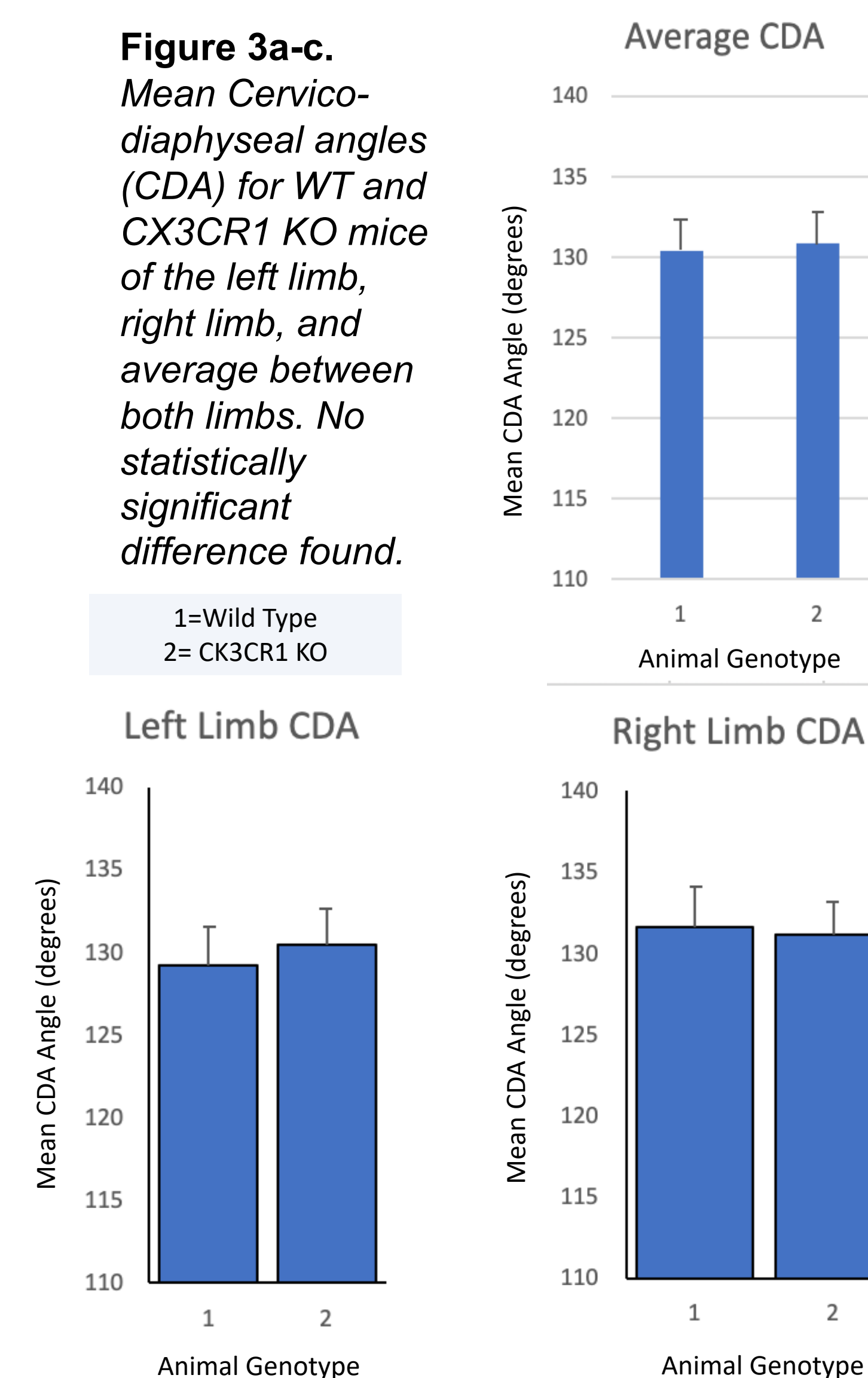


**Figure 2.** Cervico-diaphyseal angle (CDA)

## Results

- A two-sample t-test was performed to compare the mean Cervico-diaphyseal angles (CDA) in CX3CR1 knock-out vs wild-type mice.
- There was not a statistically significant difference between the mean left limb angles ( $t(40)=2.215$ ,  $p=0.399$ ), right limb angles ( $t(40)=2.423$ ,  $p=0.754$ ), and limb average angles ( $t(40)=1.927$ ,  $p=0.770$ ).

**Figure 3a-c.** Mean Cervico-diaphyseal angles (CDA) for WT and CX3CR1 KO mice of the left limb, right limb, and average between both limbs. No statistically significant difference found.



## Conclusions

- Investigation of other acetabular and hip joint variables, such as acetabular angle, should be considered in further characterization studies of the CX3CR1 KO mouse model.
- With a greater understanding of the genetic and developmental processes underlying the condition, this research could lead to better treatment options for DDH patients.

## References

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