Introduction:
Dwarfism in cats has been recorded as early as the 1930s, but disappeared sometime during World War II. Dwarfism associated with breeding a Munchkin to a Persian cat was rediscovered in 1983 and established into a recognized breed, called Munchkin, in 1994 (1). To date, the Munchkin breed has not been fully clinically and genetically characterized (Figure 1). In human achondroplasia, a mutation in the FGFR3 gene, is the most common form of human dwarfism that occurs 1 in 15,000 live births (2). There are still many unknown causes of inherited dwarfism in people. Finding the gene responsible for bone development and growth, in these cats, may reveal a new function of one of the genes and may suggest a gene implicated with dwarfism in other species. A case-control genome wide association study localized a dwarfism locus to a 16Mb critical region on cat chromosome B1.

Materials and Methods:
A significant association with dwarfism was obtained with SNPs making up a 16Mb critical region on chromosome B1 (represented by chromosome 4 above).

Results:
Clinical evaluations of affected cats’ shortened bone lengths are more notable in the thoracic limbs compared to pelvic limbs (Figures 4, 5 & 6). MRI of 1 older cat revealed intervertebral disc degeneration at 2 sites, which was considered age-related. GWAS revealed a strong association of a 16Mb critical region on chromosome B1. The region contained 60 annotated genes. After visual inspection of the associated region and literature review, none of the loci in the interval were associated with any form of dwarfism.

Conclusions:
This project represents the first phenotypic and genotypic characterization of the Munchkin breed, a successful GWAS study, and suggests a region of investigation for dwarfism. Currently a trio of cats is being whole genome sequenced and the 16 Mb region will be reevaluated for the presence of mutations associated with dwarfism.

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References:
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