phagocytic cell types contain Mtb is critical. METHODS/STUDY POPULATION: To determine the impact T cells have on different phagocyte cell populations' host defense mechanisms, groups of wild–type and T cell deficient TCRa-/- mice were infected with an Mtb strain expressing fluorescent mScarlet protein. At four weeks post-infection, a time when T cell help contributes to control of Mtb, lungs were homogenized and cells sorted based on detection of mScarlet, indicating Mtb-infected cells. Cell suspensions from each mouse background were underwent single-cell RNA sequencing analysis to reveal the heterogenous cellular transcriptional response of different phagocyte populations. RESULTS/ANTICIPATED RESULTS: We found that Mtb-infected phagocytes from wild-type and TCRa-/- mouse lungs contain the same dominant cell phenotypic clusters, but these have different patterns of gene expression. Without T cells, phagocytes are prone to a more inflammatory phenotype. DISCUSSION/SIGNIFICANCE: This will translate fundamental biological data to test the hypothesis that Mtb encounters different environmental stresses exerted by different phagocytic cell types. This work could reveal host intracellular niches that enable bacterial persistence and elucidate new pathways that could be targeted for traditional antibiotic therapies for TB.

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## Prevalence and Clinical Presentation of Chronic Neck Pain in Individuals with Generalized Joint Hypermobility

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OBJECTIVES/GOALS: Evidence suggests that individuals with generalized joint hypermobility (GJH), or excessive joint range of motion, are at higher risk of developing chronic neck pain. The objective of this study is to determine the prevalence and clinical presentation of chronic neck pain in GJH and investigate its associations with other measures of spine health. METHODS/STUDY POPULATION: Data was collected at the Driven to Discover Research Facility at the 2022 Minnesota State Fair. Individuals 18 years and older were invited to participate. All enrolled participants completed Phase 1, which included: the Beighton Score (measure of GJH), the 5-Point-Questionnaire (self-report survey for current or historical GJH), and a custom self-report survey for demographics and musculoskeletal pain. A subset of participants was also asked to complete Phase 2 of the study. Phase 2 consisted of additional self-report surveys (Neck Disability Index (NDI) and PROMIS-10 Global) and the following physical measures: neck range of motion in all planes, neck strength in flexion-extension and lateral bending, and grip strength. RESULTS/ANTICIPATED RESULTS: A total of 559 participants were enrolled in the study. All participants completed Phase 1, and 285 of those individuals completed Phase 2. Those with a Beighton Score$\geq$4 were categorized as having GJH. The overall prevalence of GJH was 23.8% for females and 9.1% for males. Consistent with previous studies, multiple linear regression analysis ($R2=0.20$, $F(2,552) = 69.37$, p DISCUSSION/SIGNIFICANCE: This is one of the largest studies investigating GJH, pain, and physical measures of neck function in the general population. The results highlight the higher prevalence of chronic neck pain in those with GJH and will form the basis for a subsequent study to identify mechanisms and potential therapeutic targets for individuals with GJH and chronic pain.

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## Radon and Fracking Exposures and Lymphoma Risk in a Canine Model of non-Hodgkin Lymphoma*

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OBJECTIVES/GOALS: The objective of this study was to determine whether residential radon and proximity to horizontal oil and drilling (fracking) are risk factors for the development of multicentric lymphoma in pet dogs, a spontaneous, immunocompetent model for non-occupational risk for NHL in humans. METHODS/STUDY POPULATION: Two case-control populations of dogs with multicentric lymphoma were utilized, with a focus on two dog breeds at high risk for lymphoma. Control dogs were matched for age, breed, and sex. Home addresses were collected for 54 Golden retrievers with lymphoma and 108 Golden retriever controls, and for 56 boxer dogs with lymphoma and 84 unaffected boxer controls. Counties of residence were matched to radon zones and percentage of home radon tests that exceeded the actionable level of 4 pCi/L, available by county through the EPA and the CDC National Environmental Public Health Tracking Network from 2008 to 2017. Locations of horizontal oil and gas wells were obtained from the Enverus Database, and distances from dog homes to the closest well, and well density by county, were calculated for each case and control. RESULTS/ANTICIPATED RESULTS: We found no significant differences in radon zones, county level radon measurements, or residential proximity to active fracking wells between dogs with lymphoma and unaffected controls in either the Golden Retriever or boxer populations. DISCUSSION/SIGNIFICANCE: Canine multicentric lymphoma resembles human NHL and is a valuable model of non-occupational environmental risk for NHL in people. Although we did not find geographic associations between radon and fracking wells, follow-up studies will measure household radon, as well as household air, water, and dog urine for potentially genotoxic chemicals.

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## Structural Determination of the CqsR CACHE Domain and its Autoinducer*,†

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OBJECTIVES/GOALS: Our goal is to determine the structure of the CACHE domain of the Vibrio cholerae quorum sensing receptor CqsR as well as its autoinducer (AI). We are performing X-ray crystallography on the protein in its apo form, with the fractions containing the AI, and with known ligand ethanolamine (ETA). METHODS/STUDY POPULATION: We have transformed BL21(DE3) E. coli cells with a pTB146 vector to contain the gene for the CqsR CACHE domain. We grow these cells to high optical density and induce protein expression, at which point we harvest them and purify the protein. This entails lysing the cells, separating the protein with Ni-NTA resin, cleaving our protein tag, and column chromatography. With purified protein, high-throughput screens are set up to find crystallization conditions of apo CqsR, CqsR-ETA, and CqsR-AI. We then determine conditions that best lead

†Wai-Leung Ng's name has been corrected. Additionally, middle initials for two authors have been added and the affiliations have been corrected. A corrigendum detailing these changes has been published (doi:10.1017/cts.2023.551).