DUSTIN M. LEALE

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PROFILE

I am an experienced researcher with 10+ years in the lab and 4+ years of bioinformatics. During my PhD in Integrative Pathobiology I learned transcriptomics and the basics of bioinformatics and expanded to genomics during my Postdoc at the Van Boxtel Lab (Prinses Maxima Centrum voor Kinderoncologie). I enjoy learning new software and teaching others, and am excited to work at the intersection of computing and biology, leveraging my deep background of lab and biological knowledge to drive insightful analysis.

EDUCATION

- PhD | Integrative Pathobiology | University of California Davis 2023
  - Dissertation: *Early effects of acute joint injury, the beginning of Post-Traumatic Osteoarthritis* | Nov 2023
- Bachelor of Science | Exercise Biology | University of California Davis 2012

CORE SKILLS

- **Animal Models | 7+ Years |** Mouse, animal handling, Tissue harvest/dissection, Medication, Injections, IACUC
- **Cell Biology | 7+ Years |** Primary cell isolation, and culture of mammalian lymphoid, myeloid and stromal cells, Cell based assays
- **Immunology | 5+ Years |** Primary immune cell isolation and culture, Flow cytometry, Mixed Lymphocyte Reaction, Immunoassays
- **Biochemistry | 7+ Years |** ELISA, Enzyme assays, Biochemical assays, Assay development, Assay Optimization
- **Molecular biology | 4+ Years |** RT/qPCR, Cell functional assays, Proliferation assays, RNA isolation, Primer design
- **Bioinformatics | 4+ Years |** Processing and analysis of transcriptomics, pathwys analysis, genomics, mutational signature analysis
- **Computational | 5+ Years |** R, Python, Seurat, Cellchat, Linux, ImageJ, Photoshop, GraphPad Prism, Power analysis, Shiny
- **Visualization | 6+ Years |** Immunohistochemistry, Confocal microscopy, Histology, Data Presentation (Microsoft Office, LaTeX)

EMPLOYMENT AND RESEARCH HISTORY

Postdoctoral Researcher ***Van Boxtel Lab*** **| Prinses Maxima Centrum voor Kinderoncologie**
May 2024 - Present Utrecht, Netherlands

Most chemotherapeutic drugs act by interrupting DNA processing or blocking the usual replication of cells. However, noncancerous cells are also damaged by treatment, which can result in the accumulation of DNA mutations in normal tissues with potentially adverse effects later in life, such as secondary malignancies, and cardiac dysfunction. Employing latest generation single-cell DNA amplification and bioinformatics analysis utilizing machine learning, this work is ongoing and will help inform future treatments.

- Isolation of patient primary cells (brain, heart, stem cells) for single-cell genetic and transcriptomic analysis.
- Developed custom multi color flow panels for single cell FACS and FANS.
- Genomic bioinformatic analysis to determine mutagenicity and mutational patterns of chemo-therapies.

PhD Researcher - Integrative Pathobiology ***Dept. of Orthopaedic Surgery*** **| UC Davis Health**
Sept 2018 to Dec 2023 Sacremento, California

I developed novel protocols to allow single-cell RNA sequencing of whole joint tissues, and used this in combination with bulk RNA sequencing to characterize the Acute Injury Response of the knee joint environment in mice. We demonstrated a time-release therapy that it safe and tolerated in equine joints, and validated it in-vitro by primary cell assay. This work has expanded the knowledge of early pathological changes in joints after injury. My work identified synovial fibroblasts as a primary responding cell population driving inflammatory changes after joint trauma as well as demonstrated the safety, tolerability and pharmacokinetics of a possible therapeutic.

- Characterized processes of inflammation and cell-to-cell communication in the first hours after injury using single cell sequencing
- Reviewed and determined optimal animal models for preclinical models of disease in large animal models
- Performed cell based assays to determine toxicity and efficacy of potential treatments, supported pharmacodynamic study
- Design of novel experiments, review literature, execution, analysis and publication and communication of findings
- Established single-cell sequencing analysis and data pipeline for complete murine knee tissues for target identification

Research Analyst ***Gilor Lab*** **| UC Davis Veterinary School**
Feb 2018 to Dec 2018 Davis, California

A single insulin injection that replaces the patient's endogenous insulin requirement would be preferred over twice-daily insulin injections for reducing patient discomfort, reducing cost, and increasing convenience. In this study we determined the pharmacodynamics of these formulations over twenty-four hours by glycemic clamp in cats providing valuable information on the activity profiles of these formulations in felines.

- Coordinated collaboration and executed research on several projects, including budgeting, purchasing, and training
- In-vivo pharmacology using isoglycemic clamps to study pharmacodynamics of insulin formulations in feline model
- Database analysis of Veterinary Medicine Teaching Hospital records to correlate diabetes risk with prior visits
- Trained students in immunohistochemistry and confocal microscopy of pancreatic islets and fluorescent imaging

Junior Specialist ***Cissell lab*** **| UC Davis Veterinary School**
Jan 2015 to Oct 2018 Davis, California
Fixation is a common technique for mandibular repair in cats and dogs. Without fixation, critical fractures may never heal and will result in deformity and loss of function. This research improved outcomes for care by informing surgeons and clinicians of the mechanical limits of fixations as well as showing that certain configurations reduced tooth root damage with minimal loss in overall strength.

- Assisted in establishment of lab: SOPs, safety, ordering, training students, and maintenance of laboratory instrumentation
- Correlated MRI, CT, medical and imaging data with underlying tissue properties in animal models and ex-vivo tissues
- Characterized the response of ex-vivo, in-vivo models of cartilage constructs to mechanical injury with or without drug treatment (Cdk9 inhibition) using rtPCR, biochemical assays and microscopy
- Optimized biochemical and bio-mechanical testing protocols for R & D use in veterinary species

Junior Specialist ***Borjesson lab*** **| UC Davis Veterinary School**
Jan 2014 to Jan 2015 Davis, California
Mesenchymal stem cells (MSCs) are a promising therapy for immune-mediated and inflammatory disorders. In this study, we investigated the use of fresh, autologous, adipose-derived MSCs for feline chronic gingivostomatitis, a chronic, debilitating, idiopathic, oral mucosal inflammatory disease. This work demonstrated the safety and efficacy of fresh, autologous, adipose-derived stem cell systemic therapy for a naturally occurring, chronic inflammatory disease in cats.

- Characterized effectiveness of stem-cell treatment in-vitro using mixed lymphocyte reactions, ELISA, and proliferation assays
- Isolated and cultured primary cells from feline and canine blood, performed flow cytometry, and serum cytokine assays to study inflammation in treatment animals

Junior Specialist ***Arzi Lab*** **| UC Davis Veterinary School**
Oct 2013 to Oct 2016 Davis, California
The TMJ is a unique synovial joint which exhibits a vast morphological and functional diversity across mammals. We characterized several species via fresh frozen or museum skull populations to study the unique adaptations of the TMJ and the osteoarthritis (OA) which can afflict it. When an animal has discomfort, pain or dysfunction of the TMJ, it has severe impact on survival as the TMJ always involved with feeding. This research increased understanding of which species are most affected by OA of the TMJ and revealed unique physiological structures, such as the joint of toothed whales - which contained nerves and fat which may be involved with the reception of echolocation signals.

- Establishment of new lab: SOPs, safety, ordering, management and training of students. Managed collaborative tissue bank.
- Studied pathology of the temporomandibular joint across many veterinary and translational species using gross anatomy & dissection, biochemical assays, radiography, microscopy, SEM, and bio-mechanical analysis

PRESENTATIONS

- *Post-Traumatic Osteoarthritis and the Early Effects of Acute Joint Injury*
  - UC Davis Musculoskeletal Research Group & Integrative Pathobiology Seminar | Exit Seminar | Davis, CA. Feb 2024
- *Joint Macrophage Populations Present Diverse Expression Profiles Following Knee Injury*
  - Osteoarthritis Research Society International | Poster | Denver, CO. Mar 2023
- *Delineating Early Cellular Crosstalk Between Structural And Immune Cells Upon Joint Injury By Single-cell RNA Sequencing*
  - Orthopaedic Research Society | **Multi-tissue Crosstalk Spotlight Talk** | Dallas, TX. Feb 2023
- *A Protocol for Single-Cell Sequencing the Cell Populations Within the Murine Knee*
  - International Cartilage Regeneration & Joint Preservation Society World Congress | Poster | Berlin, Germany. Apr 2022
- *Analysis of the Early Injury Response and Osteoarthritis Pathogenesis in the Murine Knee*
  - Orthopaedic Surgery Department Highlights |**Oral presentation** for Deans of UCD Health | UC Davis Health. Mar 2021
- *Single-cell rna sequencing workflow for the analysis of whole murine knee joints*
  - Osteoarthritis Research Society International | Poster | Virtual. Jan 2021

TEACHING AND MENTORING EXPERIENCE

- 2021-2023 - Graduate Student Mentor | Graduate Group Integrative Pathobiology | University of California, Davis
  - Guided and mentored incoming and first year students
- 2015-2017 - Mentor for Students Training in Advanced Research (STAR) Program | UC Davis Veterinary Medicine
  - Trained Veterinary and PhD students in laboratory techniques, safety, SOPs, experimental design, and scientific communication

AWARDS

- International Cartilage Regeneration & Joint Preservation Society & Orthoregeneration Network Education Grant | Jan 2022
- Third place, Poster presentation: Graduate Group in Integrative Pathology | Feb 2022
- Summer Graduate Student Researcher Award for Biotechnology, Engineering or Computer-related Applications | Jul 2021

HOBBIES

In my free time I am always excited to visit nature, whether camping, hiking or climbing. I also enjoy woodworking, spending time playing games with friends and the imaginative freedom of Dungeons and Dragons.