

VIRRC EXPRESS

Pioneering Regenerative Medicine Cures for Animals and People

2020 EDITION



Arthur & Slughorn are two spina bifida strong clinical trial patients!



SPINA BIFIDA STRONG

Spina bifida is a neural tube defect that occurs very early on during pregnancy and results in incomplete closure of the spinal cord. It is the most common neural tube defect in humans affecting approximately 1500-2000 births each year in the US. Symptoms include trouble walking, muscle weakness and incontinence. Like humans, dogs can also be affected with spina bifida and treatment options are limited. The VIRC is fortunate to have talented regenerative medicine researchers who dedicate their lives to stem cell science and embrace the One Health approach to use novel stem cell therapies to help both animals and people.



Spina bifida is a birth defect that can affect both people and animals.

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UC DAVIS

VETERINARY MEDICINE

Veterinary Institute for Regenerative Cures

DIRECTOR'S CORNER



BOAZ ARZI,
VIRC Director

We are excited to welcome you to the 4th edition of the Veterinary Institute for Regenerative Cures (VIRC) 'VIRC Express'!

The new appearance of this edition is fitting as the past year has been a year of change for the VIRC. Dr. Dori Borjesson, VIRC inaugural Director, stepped down in March, 2019 and has continued to support the VIRC and all of its activities! Since then, we have welcomed Dr. Boaz Arzi as the new VIRC Director and Lisa Even as the Assistant Director. We are proud to watch the VIRC continue to grow and evolve as an institute. We have strengthened our current academic and industry partnerships by attending conferences and hosting collaborative group meetings and seminars. Perhaps more importantly, we have continued to pioneer advances in veterinary regenerative medicine through our ten (and counting) veterinary clinical trials for dogs, cats and horses. The VIRC's vision is to improve lives through regenerative medicine with a specific goal to develop and integrate regenerative medicine discoveries into clinical practice and we hope that these discoveries will translate one day to human medicine where many similar diseases are seen. With the VIRC we are building upon the commitment, enthusiasm and energy of a group of faculty, staff and students that believe in the promise of regenerative medicine to improve the lives of animals and their people and we continue to strive to be the best veterinary regenerative program in the country.



THE VIRC TEAM

Boaz Arzi, Naomi Walker,
Ubaldo DeLaTorre, Lisa Even

LISA EVEN,
VIRC Assistant Director



The VIRC receives it's 1st endowment in regenerative medicine

The VIRC is pleased to announce the Michelle Malcolm Franklin Endowment & Fund in Veterinary Regenerative Medicine. Created by Arlene Rose and supported by Arlene Rose and Bob Malcom, this fund was made to honor Michelle Malcom Franklin. Michelle was a veterinary technician who studied at UC Davis. She was employed by Mendocino County Youth Project as a youth/family advocate and community developer. Michelle was also a talented artist who cared deeply about the welfare of children and animals. She was inspirational to a generation of young people in her community.



Above: Michelle and Arlene, Hammerhorn Ridge, Yola Bolly Mtns. Mendocino County, 1989. Photo taken by Michelle's husband, John Franklin.



VIRC Director Boaz Arzi & Bob Malcom visit UC Davis Biomedical Engineering's TEAM 3D printing lab

NOVEL REGENERATIVE MEDICINE THERAPIES

Spina bifida is most common in the English bulldog breed, but may affect other breeds as well. In 2018, VIRC member Dr. Aijun Wang (UC Davis School of Medicine) and Drs. Dori Borjesson and Beverly Sturges (UC Davis School of Veterinary Medicine) received a grant from the Shriners' Hospital for Children to study how stem cells placed near the spinal cord may help repair the lesion in bulldogs born with spina bifida. To date, we have enrolled 6 dogs and have now followed two of them for two years. While the progress we see is encouraging, there is much more to learn as the clinical trial moves forward. We have certainly come a long way and we now have specialized equipment to monitor nerve function and record walking patterns which helps us better understand various aspects of the treatment. We are currently enrolling bulldogs with spina bifida as well as normal healthy bulldogs to gain comparative normal movement data. More information on this and other stem cell based clinical trials can be found on our website at www.virc.vetmed.ucdavis.edu



Top: Dr. Sturges and Lisa Even examine Slughorn at one of his follow up visits.

Middle: Kasey Clark and Camille Reed help at the gait lab during one of Sirius' follow up visits.

Bottom: The spina bifida team pose for a picture with news reporter Cambi Brown after appearing on a segment of "Good Day Sacramento".

At the UC Davis School of Veterinary Medicine, we believe that the lengthy approval time for new human drugs along with the high failure rate may be overcome by inserting a new developmental phase into the drug development process. This "Phase 0" stage would allow for the treatment of naturally occurring diseases (comparable or similar to a human disease) in companion animals when that disease exists. Conditions including oral inflammatory disease, inflammatory bowel disease, heart disease and spinal cord injury are just a few examples of diseases that occur in both animals and people. Given the diversity in the animal population we believe we can better predict the efficacy of drug therapies in humans while simultaneously developing new drug therapies for animals. Many of the VIRC's veterinary clinical trials are focused on animal to human translation, also known as the One Health approach. Our goal is to enroll pets with medical conditions that may have a human counterpart so that we can help drive discoveries forward in human and animal health.



The power of Naturally Occurring Disease Models:

- A Clear Vision for Clinical Translation

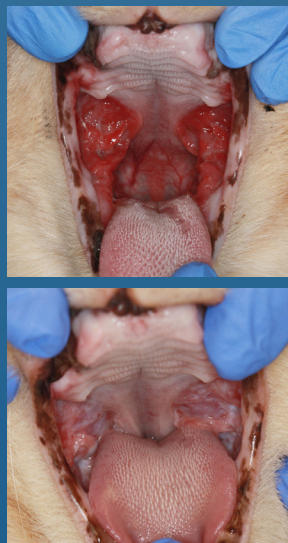
FDA APPROVED VETERINARY CLINICAL TRIALS

One of the VIRC's top priorities is making sure our veterinary clinical trials are held to the highest standards and remain fully compliant. We work closely with the veterinary FDA and currently hold 8 separate INADs (Investigational New Animal Drug) applications to cover the use of mesenchymal stem cells for various diseases in large and small animals. All of our clinical trials are supported by our clinical regenerative medicine laboratory (RML) where highly skilled cell culture technicians oversee cell manufacture and quality control. Before any treatment goes into an animal, the technicians ensure that all cells are sterile, living, potent and pure. For more information on our current clinical trials, please visit www.virc.vetmed.ucdavis.edu. Exciting things to come: new veterinary clinical trials for myasthenia gravis, feline enteropathies, and activated stem cells for treatment of persistent infection.



CLINICAL TRIAL SPOTLIGHT

Over 3-years-ago, Piglet enrolled in our clinical trial to use mesenchymal stem cells as a novel regenerative medicine treatment for feline chronic gingivostomatitis (FCGS). Piglet's 3-year re-check demonstrates a continuing full cure! Piglet, her owner & her treatment team couldn't be happier.



Pictured here is P Club, a thoroughbred racehorse with two previous race wins, two places and one show. In 2016, P Club was diagnosed with superficial digital flexor tendonitis, a common cause of lameness that leads to decreased return to racing. As our clinical trial patient, P Club received multiple stem cell injections and, in 2017, was back on the racetrack with ten starts and went on for one win and a first place.

A BOOST TO BURN CARE

2019 was a big year for VIRC member Dr. Jamie Peyton, Chief of the Integrative Medicine Service at the Veterinary Medical Teaching Hospital. She and her team spent countless hours helping animals burned in the California wildfires. She was honored for her work and earned the 2019 Chancellor's innovators of the year award for her successful and groundbreaking use of tilapia skin to treat animals with burns. Drs. Peyton and Vapniarsky-Arzi were awarded an innovative development and STAIR awards grant to determine how this novel technique works so well for burn healing and pain management.

Dr. Peyton was also recently featured on an episode of Nat Geo Wild's "Yukon Vet" with Dr. Michelle Oakley treating a severely burned patient. The team also spent time in Australia helping animals affected by the Australian wildfires.

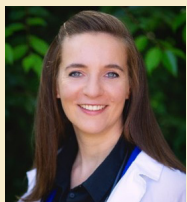
Top: Dr. Peyton and one of her burn patients.

Middle: Lisa Even and Dr. Boaz Arzi take a picture with Dr. Peyton after her seminar to the VIRC membership.

Bottom: Drs. Peyton and Vapniarsky-Arzi.



Meet our Newest VIRC Members



**Sina Marsilio,
DVM, PhD,
DACVIM,
DECVIM**

Dr. Marsilio is a small animal medicine faculty clinician. Her research focuses on intestinal health. She will soon be starting a clinical trial using stem cells to treat chronic intestinal disease in cats.



**Natalia
Vapniarsky-Arzi,
DVM, PhD,
DACVP**

Dr. Vapniarsky-Arzi is a pathology faculty member. Her research focuses on tissue engineering, especially cartilage and the temporomandibular (TMJ; jaw) joint. She is working on developing treatment for a dog orthopedic disorder called OCD using tissues normally removed from an injured joint.



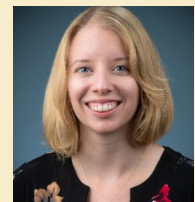
**Christine
Toedebusch,
DVM, PhD,
DACVIM**

Dr. Toedebusch is a neurology faculty member. Her research focuses on the cells that mediate inflammation and tumors in the brain. She will be a great team member for our clinical trials focused on inflammation in the brain.



**Jamie Peyton,
DVM,
DACVECC,
CVC, CVA, CCRT**

Dr. Peyton's clinical and research program focuses on pain management and wound care including the novel use of tilapia skin to help relieve pain and induce healing in burn patients.



**Jennifer
Cassano,
DVM, PhD**

Dr. Cassano is a faculty member in equine field service. Her research focuses on how to enhance the function of stem cells for use in equine sports medicine.

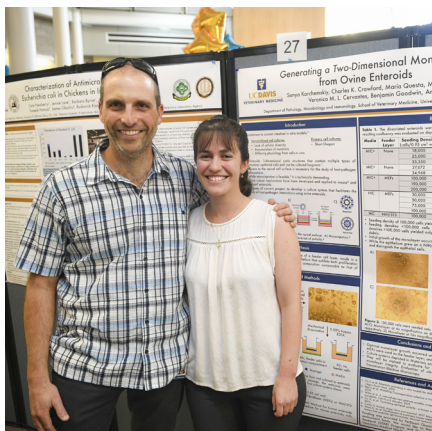
VIRC members host veterinary **SUMMER STAR STUDENTS** (Students Training in Advanced Research)

Dr. Amir Kol's laboratory

Title: Establishing an intestinal organoid model system

Intestinal organoids are 3D cellular structures that have the cellular complexity of intestinal epithelium and can be continuously cultured in vitro. Organoids are generated from intestinal stem cells. Toxoplasma, an important human protozoal pathogen, often transmitted to humans from sheep gains access into the host body via the intestinal epithelium.

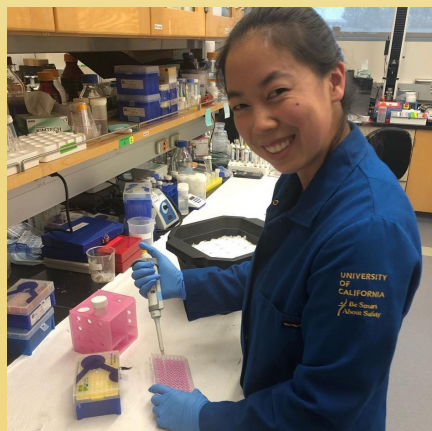
This past summer, Sonya Karminchski, a STAR student in Dr. Kol's laboratory, developed a modified organoid system to facilitate Toxoplasma infection of intestinal cells. Sonya successfully optimized culture conditions and the modified intestinal organoid system that will allow to better understand Toxoplasma infection of the intestinal epithelium.



Dr. Kent Leach's laboratory

Title: Immune modulation to improve bone regeneration in bisphosphonate-related osteonecrosis of the jaw (BRONJ)

Katherine Griffin, a STAR student in Dr. Kent Leach's lab investigated complex interactions between inflammation and osteogenesis through mesenchymal stromal cell (MSC) manipulation with biomaterials and immunomodulatory factors. She synthesized polymer microparticles for controlled growth factor delivery, and she modified alginate hydrogels to meet the desired mechanical properties. Ongoing work will combine these biomaterials with MSCs to evaluate their effects on osteogenic potential. The results of these studies will establish the efficacy of pharmacological strategies to enhance cellbased therapy.



Dr. Christine Toedebusch's laboratory

Title: Determination of the role of Olfactomedin-like 3 in brain endothelial cell angiogenesis

Glioblastoma multiforme (GBM) is the most common and aggressive primary brain tumor of adults. A key feature of GBM malignancy is new blood vessel formation, which promotes tumor growth. Specific immune cells of the brain called microglia can contribute to glioma growth and invasion. This past summer, Aurelie Bastian, a STAR student in Dr. Toedebusch's laboratory, set out to determine if exogenous OLFML3 (glycoprotein olfactomedin-like 3) would increase blood vessel formation in mouse brain endothelial cells. She was able to optimize culture conditions and developed tube formation assays, which are a measure of angiogenesis and her studies suggest that OLFML3 increases new blood vessel formation in brain endothelial cells.



GET INVOLVED!

How you can **GET INVOLVED** and help the **VIRC!**

Just as with human patients, chronic inflammatory disease, spinal cord injury, heart disease, orthopedic disease and neural degenerative disorders can also affect animal patients leading to a poor quality of life. Regenerative medicine holds tremendous promise to reduce pain and suffering and eliminate disease. By promoting both stem cell biotechnology and tissue engineering, **the VIRC is leading the way in developing novel therapeutics for animals and people.** In order to realize the full potential of regenerative medicine in veterinary and human patients, assistance from individuals such as yourself, is needed and greatly appreciated. Your support of our program can be directed towards helping dogs, cats or horses with incurable diseases through direct engagement with our clinical trials program. We are working with significant diseases that affect both animals and people including spina bifida, severe oral inflammation, inflammatory brain disease (similar to some forms of multiple sclerosis), and ailments like tendonitis and laminitis in equines. In the coming year, we want to extend our work towards myasthenia gravis in dogs, feline chronic enteropathies and activated stem cells for chronic infections. Your support can help drive the basic and clinical research that moves novel therapies from the lab into our patients.

With your help, together we can strengthen the regenerative medicine infrastructure at the #1 ranked UC Davis, School of Veterinary Medicine, enable more animals to be treated in potentially life-saving clinical trials, inspire and educate students and support our basic and translational research efforts for several diseases so we can continue to establish ourselves as the premier Veterinary Regenerative Medicine Program.

Thank you for all of your support.



Education

- Graduate Student Support
- DVM Fellowship
- DVM Summer Research Fellowship
- Sponsor established K-12 diversity/outreach programs

Research

- Pilot Grant Program
- Bridge Grant Program
- Travel awards for students/trainees

Endowment

- Ensure financial sustainability of the VIRC
- Build infrastructure to promote success in research and education

To donate to the VIRC, please visit our webpage at www.virc.vetmed.ucdavis.edu



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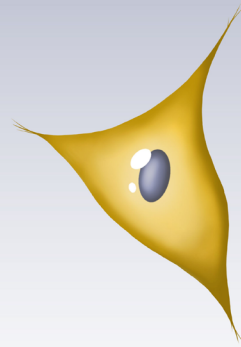


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The VIRC is excited to announce **RegenMed2020!**

Our regenerative medicine
symposium will be held on
Saturday August 29th 2020.
The goal of this symposium
is to bring together
regenerative medicine
researchers, staff and human
& veterinary clinicians to the
UC Davis campus for a day
of learning and collaboration.
For details, please email
virc@ucdavis.edu

SAVE THE DATE



RegenMed 2020

Aug. 29 | UC Davis, CA

A Translational Regenerative Medicine Symposium

#regenmed2020

Hosted By:



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