Preface

It is my pleasure to present our annual report for 2011 from the Trueman Equine and Comparative Orthopedic Research Program. Our program continues to be well funded from extramural sources and to provide high quality publications to disseminate knowledge of our research results. Our Comparative Orthopedics Research Program has continued to publish and be presented in the most highly respected journals and scientific meetings, respectively. Our biggest programmatic accomplishments this year were the addition of two extramurally funded clinical trials, one in horses and one in dogs, that have impacted the treatment of our clinical veterinary patients with osteoarthritis. Our interdisciplinary and comparative mission has continued to thrive with the completion of a research collaboration with the Department of Orthopedics in the College of Medicine, that resulted in several awards in the orthopedic medical arena and represented translational work that impacted our clinical program. We performed the first, to the best of our knowledge, allotransplantation of a genetically engineered fetal chondrocyte graft in a horse with eroded cartilage. Although others have implanted neonatal chondrocytes by themselves in experimental animals and on the surface of scaffolds, our laboratory is the first to genetically engineer these cells to produce a cartilage forming gene and transplant them as scaffold free cell constructs. We plan to serve our clients and patients with experimental cell therapy over the next year. Our goal is to provide a cell culture service that can produce and cryopreserve cells for therapies in dogs, cats, and horses in our newly constructed Cell Culture Laboratory as a clinical service.

Our research progress has resulted in another productive year to date, both in number and quality of publications with 12 peer reviewed original publications, as well as in research expenditures. Specifically, the lab received two new contracts in 2010-11, all in the area of regenerative biologics and cell therapy. Most of the extramural studies provided funding for our Regenerative Medicine Program and Clinical Trials Program. Active scientific research projects in the laboratory currently include (1) the chondrogenesis potential of a novel source of human cartilage and synovial cells, (2) the immunotolerance of allogeneic and xenogeneic cells used for joint therapy, and 3) the evaluation of the use of concentrated bone marrow aspirates as a therapy for osteoarthritis.

In addition to doing the research, we have continued to disseminate information at national and international equine scientific meetings, orthopedic research meetings, and cartilage focus meetings. This year (2011) was our most prolific year to date with the selection of over 45 abstracts for presentations at international, national, regional, and local meetings focused on orthopedics and regenerative medicine. Dr. Bertone was invited to present our research data at an equine international meeting in Paris, France, and also produced book chapters in equine orthopedics. We have relayed our work to horse owners through publications and news articles in lay journals and presentations to Breed Councils.
We look forward to the future with great enthusiasm. We anticipate exciting discoveries and benefits for orthopedic conditions in horses that will ultimately extend to people with similar conditions.

Alicia L Bertone, DVM, PhD, Diplomate American College of Veterinary Surgeons
Trueman Family Endowed Chair and Professor
The Ohio State University
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**Mission**

Our mission is to investigate musculoskeletal biology and molecular medicine therapies that are associated with orthopedic disease conditions in horses, companion animals, and humans. Under this umbrella, we will study gene therapy systems and tissue engineering, as well as utilize a comparative approach in our research. We are dedicated to the efforts that are necessary for translational research which moves from “bench to bedside”. We will focus on conditions and therapies that are designed to be directly beneficial to our patients. This year we have emphasized clinical trials.

Our six main research focuses are:

1. Enhancement of articular cartilage healing with emphasis on the cartilage/bone interface
2. Acceleration of bone repair
3. Identification of genetic markers of orthopedic disease
4. Physiology and pharmacology of medications for joint disease
5. Optimizing gene therapy protocols for use in patients with orthopedic disease
6. Regenerative Medicine for musculoskeletal disease

**2011 Supporters of our Program**

- Trueman Family
- Pfizer, Inc.
- Federation Equestre Internationale
- Free Stride, LLC
- United States Equestrian Federation
- PALL Corporation
- Biomet Corporation
- Sports Medicine and Department of Orthopaedics
Dr. Bertone received her Bachelor of Science degree (1977), DVM degree (1982) and internship (1983) from Cornell University, subsequently completed a combined surgery residency/PhD program (1987) at Colorado State University and joined the surgery faculty at Louisiana State University that same year. Dr. Bertone became board certified as a Diplomate in the American College of Veterinary Surgeons in 1988 and joined the surgery faculty at The Ohio State University late in 1989. Dr. Bertone focused her clinical and research efforts in the field of orthopedics and became a full professor in 1997. Dr. Bertone has mentored many PhD and Masters of Science graduate students, surgery residents and research fellows and has developed a reputation for a quality and productive research program. Dr. Bertone has been recognized as one of the top extramurally funded researchers in the College of Veterinary Medicine and has greater than 150 peer reviewed scientific manuscripts and over 280 scientific abstracts. After completing a one-year sabbatical at the Center for Molecular Orthopedics at Harvard University (2000), Dr. Bertone was appointed to the Trueman Family Endowed Chair (2001) and established the Comparative Orthopedic Molecular Medicine Suite and Applied Laboratories with the directive to promote translational orthopedic research to the benefit of horses, humans, and all companion animals. Dr. Bertone is an active member of many university initiatives and institutes, including the Department of Orthopedics in the College of Medicine, the Dorothy Davis Heart Lung and Research Institute, and the Center for Regenerative Medicine and Cell Based Therapy. She also serves as the Assistant Director of Basic Science and Industry Research for the Ohio State Sports, Health, and Performance Institute. Dr. Bertone's research focus is in the study of comparative orthopedic medicine and gene therapy for the treatment of cartilage injury and bone repair. Dr. Bertone has been active in veterinary and human orthopedic associations and served on the Board of Regents for the American College of Veterinary Surgeons. Dr. Bertone has been regularly invited to participate in national and international scientific meetings for her expertise in orthopedics and orthopedic research. Dr. Bertone maintains a clinical caseload in equine orthopedics at the Galbreath Equine Center in the Veterinary Medical Center at Ohio State.

Dr. Santschi is a Clinical Associate Professor, with special interest in orthopedic bone cysts of the stifle, at The Ohio State University College of Veterinary Medicine. Dr. Santschi completed her DVM degree at the University of Illinois in 1984, followed by a large animal internship at North Carolina State University. Dr. Santschi received advanced training in equine surgery in the surgical residency program at the Peterson and Smith Equine Hospital, in Ocala, Florida, and became board certified by the American College of Veterinary Surgeons in 1992. Dr. Santschi held positions as Instructor of Surgery at Purdue University, Assistant Professor of surgery at the University of Minnesota, and Associate Professor at the University of Wisconsin, before joining the faculty at The Ohio State University in 2007.
Dr. Kelly Santangelo recently received her PhD degree in winter 2011 following completion of her primary thesis project – work for which she was awarded a NIH Kirschstein NRSA (F32) Post-Doctoral Research Fellowship – aimed at determining the role of interleukin-1β mediated signaling in an animal model of primary osteoarthritis. Since joining the Comparative Orthopedics Laboratory in late 2004, Dr. Santangelo has participated in several research projects and accrued eight published or accepted manuscripts, many of which have first or coauthor credit, and currently has an additional four manuscripts under review or prepared for imminent submission. In addition, Dr. Santangelo entered into the clinical pathology residency in spring 2009, a program which will complement and enhance her graduate degree in applied molecular biology, and was awarded a competitive GlaxoSmithKline and ACVP/STP Coalition Award to fund this continued training. Finally, Dr. Santangelo is pleased to have been awarded the prestigious Harold W. Casey Award, which recognizes one individual each year training in pathology. Dr. Santangelo looks forward to continued collaborative research with the Bertone laboratory in the field of musculoskeletal disorders as she prepares for the board certification examination in her clinical discipline in September of 2012.

Dr. Ishihara, who successfully completed his PhD program in molecular therapy for equine bone healing in December 2009, has been working in our laboratory as a research associate. Dr. Ishihara has been dedicated to defining the bone healing model to study bone morphogenetic protein [BMP] gene therapy for the acceleration of bone healing in horses, including quantitative gait analysis, quantitative computer tomography, torsional biomechanical testing, and gene expression. This project successfully competed for funding from the Grayson Jockey Club research foundation in 2005. This work is completed and published the Journal of Orthopedic Research in 2008. Dr. Ishihara has also studied cell-mediated BMP gene therapy for acceleration of bone healing in horses, as the continuation of the gene-mediated therapy. The large in vivo project has been completed in 2008 and the results were published the Gene Therapy in 2010. Dr. Ishihara has also completed an in vitro study to assess the adenoviral transfection efficiencies of the cell types anticipated to uptake his constructs in vivo and has completed the large scale production of his gene constructs needed for his studies. This paper was published in the American Journal of Veterinary Research in 2006. Dr. Ishihara has received funding for a proposal on the kinetic and subjective evaluation in horses with hind limb lameness or neurologic gait abnormalities from the Ohio State Research Council. This project was completed and published in the Journal of American Veterinary Medical Association in 2009. Dr. Ishihara was also awarded an extramural two-year fellowship and research grant by the Osteogenesis Imperfecta Foundation from 2008 to 2010. In this work, Dr. Ishihara has demonstrated the efficacy, safety, and feasibility of cell-based therapy to improve bone mineral density as a potential therapeutic method for Osteogenesis Imperfecta, one of the most difficult hereditary osseous disorders in the human orthopedics field. The results of this project will be submitted to Journal of Bone and Mineral Research in 2012. Dr. Ishihara has served as project director for two ongoing equine clinical trial projects, cell-based BMP2 therapy for bone healing, and Autologous Protein Therapy for equine osteoarthritis. Dr. Ishihara received his Bachelors of Veterinary Science degree from Azabu University, School of Veterinary Medicine, Japan and has completed a two year visiting clinician and scholars program at the Ohio State University followed by a competitive rotating equine internship at Louisiana State University prior to entering our PhD program.
Hayam Hussein is a first-year PhD student. She joined Dr. Bertone’s lab Winter 2012 with a scholarship funded by the Egyptian Government. She graduated from South Valley University, Egypt, in 2004 with a Bachelor degree of Veterinary Medical Sciences. Then she joined the National Research Center in Cairo, Egypt as an assistant researcher. She completed her Master degree of Veterinary Medical Sciences in 2009 at Zagazig University, Egypt. Hayam’s research will focus on differentiation of mesenchymal origin stem cells toward epitheliod pathways for use in epithelial wounds such as in skin and hoof.

Eric Skinner graduated from Boston University in May 2010 with a Bachelor’s degree in Biology, research experience in Genetics and Cellular Biology, and a specialization in Cell Biology, Molecular Biology, and Genetics. He joined Dr. Alicia Bertone’s research program in November of 2010 as a research technician and transitioned to a graduate research associate. Eric is currently focusing on identifying novel molecular intervention sites in Osteoarthritis by gene and bioinformatic analyses. His future goals are to achieve his PhD and become an NIH-level independent researcher leading his own research team as well as a leader in the field of gene therapy for clinical medicine. Eric is working on a metanalysis of published work on large scale gene expression in osteoarthritis and collecting OA samples from patients undergoing knee replacement surgery.

Seth Jump entered the postdoctoral research program of the Comparative Orthopedic Laboratory in September 2009. He came to the laboratory with training in muscle cell biology and growth factor influence on intracellular signaling. Prior to beginning at Ohio State, he completed his doctoral training at the University of Missouri-Columbia in Biomedical Science. At Missouri, he investigated how the aging process affects the responsiveness of satellite cells (skeletal muscle reparative cells) to growth factors, research which was funded by a pre-doctoral training grant from the National Institute of Health. Prior to his training at the University of Missouri, Dr. Jump earned a master's degree from Ohio University in Exercise Physiology and Muscle Biology and taught anatomy and physiology at Hocking College. As the Sports Medicine Fellow in research, he conducted studies to investigate the effects of therapeutic proteins for potential future use in cartilage restoration treatments. His previous experience in cell physiology and cell culture has enabled him to complete collaborative projects at the Sports Medicine Center investigating a novel cell source, the synovial-derived mesenchymal stromal cell (SDMSC), for the restoration of cartilage. These projects have investigated the potential immune response to the SDMSC and the effectiveness of the SDMSC to deliver therapeutic proteins to chondrocytes. In this study, he has worked directly with Dr. David Flanigan, Dr. Vince Ng, and Eric Skinner. Two manuscripts resulted from this work, one published in Open Journal of Cell Biology and one submitted to Osteoarthritis and Cartilage.
Dr. Christine Pariseau is a second-year equine field service resident (ABVP) and Masters of Science graduate student. Dr. Pariseau completed both her Bachelor of Science degree (2005) and her DVM degree (2009) at The Ohio State University. Following graduation, she completed a one-year rotating internship at Wisconsin Equine Clinic and Hospital in Oconomowoc, Wisconsin. Dr. Pariseau is currently investigating the effect of intraneural injection of ethyl alcohol on palmar heel pain in the horse.

Dr. Vincent Ng is a fifth-year resident in the Orthopedic Surgery training program in the College of Medicine at The Ohio State University. He has completed a one-year clinical and basic science research-intensive fellowship in the Comparative Orthopedics Research Laboratory. Dr. Ng will graduate residency in 2013 and plans on pursuing a fellowship in either Adult Reconstruction and Total Joint Arthroplasty or Orthopaedic Oncology. Dr. Ng received both his undergraduate and medical education at Ohio State, receiving a bachelor of science in biology and a doctorate in medicine. In addition to maintaining solid clinical and operative fundamentals, Dr. Ng is an avid researcher with over 25 peer-reviewed articles and four textbook chapters in publication or accepted for publication. He is a peer reviewer for international orthopaedic journals in hip and knee arthroplasty and currently has more than 15 projects either submitted for publication or in progress. Dr. Ng serves as a resident liaison for the Ohio State medical student orthopaedic surgery interest group, is a research mentor for multiple medical students, and has assisted an undergraduate volunteer for the Annual Denman Research Forum. Harnessing the experience and knowledge gained through previous work by the Comparative Orthopedics Research Laboratory, Dr. Ng has incorporated the use of juvenile human donor chondrocytes and scaffold-free neocartilage with genetic engineering with adenoviral vectors and enhancement with bone morphogenetic protein 2 to explore the potential of novel chondral treatment modalities. Dr. Ng has received awards for his work at the Ohio State Medical Center Research Day, and Annual Conference for the American Academy of Orthopaedic Surgeons.

Dr. John Pigott is a second-year equine surgery resident and Masters of Science graduate student. Dr. Pigott completed both a Bachelor of Science and a Bachelor of Arts degree at the University of Vermont (2005). He then went on to complete his Doctor of Veterinary Medicine degree at Cornell University (2009). At Cornell he performed equine upper airway research with a focus on dorsal displacement of the soft palate. He is currently investigating the safety of intra-articular mesenchymal stromal cells in horses as a potential future treatment of osteoarthritis.
Lee Rise, MD

Dr. Lee Rise is a resident in the Orthopedic Surgery residency program in the College of Medicine at The Ohio State University following a clinical internship in the Department of Orthopedics. Dr. Rise completed a six-month research intensive experience in the Comparative Orthopedics Research Laboratory as part of his orthopedic residency program and graduated from the program in 2011. Dr. Rise graduated from medical school at the University of Florida in 2004 and received a B.A. in Interdisciplinary Natural Sciences from the University of South Florida. While in medical school, Dr. Rise participated in two research projects, the first with Dr. Peter Gearen investigating the intraoffice evaluation of intra-articular infections using a rapid, fluorescent dye wet prep and the second on a study of fixation methods in allograft prosthesis composites. His research on AIDS-associated Kaposi's Sarcoma was published in Acta Oncologica in January, 2002. He presented a poster at the Orthopaedic Trauma Association's 2010 annual meeting outlining perspectives on surgical volunteering from his experience after the 2010 Haiti earthquake. Dr. Rise's current project is evaluating the influence of bone morphogenic protein-2 on the invasive and proliferative properties of human osteosarcoma cell lines. BMP-2 can be used to counteract the bone loss and fractures secondary to tumor metastasis, but BMPs are also potent activators of cellular metabolism and possibly tumor expansion. Dr. Rise is expected to complete this research in 2012.

Amelia Kaeding graduated in May 2011 with a Bachelor of Science with Distinction in Zoology. Since September of 2008, she has been working in the Comparative Orthopedic Research Laboratory on a research project entitled "Validation of objective and quantitative techniques to assess gait abnormalities of guinea pigs with varying degrees of progressive primary osteoarthritis" which served as her Honor's research project and for which she has received a grant from the Dean's Undergraduate Research Fund and a scholarship from the Hall Scholarship Fund. She presented her research findings at the Denman Undergraduate Research Forum, as well as the 2010 Undergraduate Research Forum of Biological, Mathematical, and Physical Sciences.

Samantha Dyer is in the fourth year of her undergraduate degree and expects to graduate in fall of 2012 with a Bachelor of Science in Biology and a minor in Portuguese. She has been working in the lab since November 2010 and aspires to enroll in an MD program. Samantha's previous project "In Vitro Physical Characteristics of Genetically Engineered and Scaffold-free Neocartilage for Articular Cartilage Implantation", was presented at The Denman Undergraduate Research Forum in 2011. She recently finished a research exchange in Brazil and her research project was "Canavalia ensiformis urease effects on Dysdercus peruvianus' hemocytes." Samantha was accepted into the Honors Research Program at Ohio State and plans to graduate from Biological Sciences with Distinction.
Rebecca Schwarze is a third-year veterinary student at The Ohio State University College of Veterinary Medicine and will graduate in the spring of 2013. She completed her undergraduate course work in 2009 at The Ohio State University prior to admittance into veterinary school. Rebecca joined the Trueman Equine and Comparative Orthopedic Research Program in April of 2011, assisting with the clinical trial of intra-articular administration of autologous protein therapy in horses. As a part of this study, she assisted with force plate analysis using Kistler Bioware software, weekly treadmill exercises, and preparation of autologous protein treatments. Rebecca focused her research efforts as an independent research course, where she determined carpal, tarsal, metacarpophalangeal, femoropatellar, and femorotibial synovial fluid protein levels and performed ELISA assays to identify IL-1β, TNF-α, and IL-1ra levels in the joint fluid of OA affected horses. After veterinary school, Rebecca plans on entering into an equine internship, followed by a surgical residency program.

Andrea Barnaba is in the third year of her undergraduate degree and is expecting to graduate in the fall of 2013 with a Bachelor of Science in Animal Sciences. She completed an internship in the summer of 2011 at the College of Agriculture under Dr. Alicia Bertone, working on an Osteoarthritis study on horses. Andrea has been working in the Veterinary Medical Center since March of 2011. Andrea will be applying to the Ohio State College of Veterinary Medicine's Research Day in April 2012.

Katie Lewis is a third-year veterinary student at The Ohio State University, who joined the Comparative Orthopedics Research Laboratory as a Grope summer research scholar in 2011. Katie received her Bachelor of Arts degree in Biology from Saint Thomas University in Minnesota (2004) and is expected to receive her DVM from The Ohio State University in 2013. Along with Dr. Bertone's research team, Katie investigated the effects of an autologous protein solution on lameness scores and force plate gait analyses in naturally occurring equine osteoarthritis. An interim report on this subject was presented in August 2011, and the final report was presented at the Ohio State College of Veterinary Medicine's Research Day in April 2012.

Andrea Barnaba is in the third year of her undergraduate degree and is expecting to graduate in the fall of 2013 with a Bachelor of Science in Animal Sciences. She completed an internship in the summer of 2011 at the College of Agriculture under Dr. Alicia Bertone, working on an Osteoarthritis study on horses. Andrea has been working in the Veterinary Medical Center since March of 2011. Andrea will be applying to the Ohio State College of Veterinary Medicine and aspires to focus on equine lameness. She has also recently completed the 2012 Animal Sciences Study Abroad program in Australia.
The Comparative Orthopedic Molecular Medicine Suite is room 325 of the Veterinary Academic Medical Building (VMAB). The VMAB is located at The Ohio State University’s Veterinary Campus and is a > 100,000 sq. ft. facility dedicated to research laboratories on the top 2 of 4 floors. The Comparative Orthopedic Molecular Medicine Suite is 1069 sq. ft. of laboratory space with bench tops, internet-connected workstations, shelving and cabinets contained in modules B, C and D. Room 325B is 550 sq. ft. dedicated to DNA processing and gene expression analysis and contains two laminar flow hoods, a –80C freezer, an Iso Temp – 20C freezer, refrigerator, Applied BioSystems Taqman 7000 Sequence Detection System (RT-PCR analyzer) and dedicated PC computer with Primer Express software, refrigerated Micro centrifuge, (2) MJ minicycler PCR Centrifuge engines, a Sorvall RC-5C Microcomputer Controlled Super speed Refrigerated Centrifuge with changeable rotors, New Brunswick Incubator/Shaker, Eppendorf Electroporator 2510, electrophoresis gel-casting units, pH meter, analytical balance, water and dry baths, pipetters, supplies, glassware and other accessories necessary for molecular biology applications.

Also in 325B, a central area houses a BioMate3 Spectrophotometer, Zylux Tube Luminometer, Kodak GelDoc Photography digital imaging system, and ultra Microplate reader served by a Dell 1.7 Gb processor. An iMac (1 Gb) computer with accessories including a digital still/video cam recorder, 6-card reader, and CD burning capabilities serves this section. This card reader serves as the computer interface for the digital image capture systems on the GelDoc, Olympus CK40 Inverted and CX41 Compound Microscope and Canon Elura 20 MC Video chip/digital camera. Room 325C is 450 sq. ft. dedicated to cell/tissue culture and vector propagation and contains two laminar flow hoods, one that operates at BSL2-level containment. The module contains (2) ThermoForma water jacketed forced air, reach-in CO2 incubators, water bath, pipetters, refrigerator, Maytag dishwasher, Barnstead thermolyne autoclave, tissue homogenizer, liquid nitrogen storage tank, Olympus CK40 inverted florescent microscope with viewing screen, Olympus DP12 digital camera and Olympus P330N color printer. A power G3 computer serves this section.

Room 325D is 100 sq ft of laboratory space, remodeled in 2011, to serve as the Animal Stem Cell Core Laboratory. The Animal Stem Cell Laboratory will culture and cryopreserve dog, cat, and horse and other species’ stem cells for basic research and translational research use. The laboratory will be able to operate Good Laboratory Practice (GLP) for studies requiring regulatory compliance. The laboratory contains a laminar flow hood for cell culture, CO2 jacket incubator, centrifuges, locked cabinets and a computer station. This laboratory will function as a college resource for faculty engaged in cell therapy research.
The Laboratory for Gait Analysis and Applied Research is Room 1338 of the Veterinary Hospital and is directly adjacent to the in ground force plate. This 425 sq. ft. laboratory contains an animal holding and working area separated from the equipment and laboratory area by containment rails. This laboratory is designed for direct evaluation of live research animals to permit short procedures using hospital equipment, such as fluoroscopy, ultrasound and quantitative computer tomography on research animals (rabbits, cats, sheep, dogs, horse, calves etc.) in a designated area. This section has a central drain, rubber floor, containment rails, hoses and cabinets. The laboratory section contains 32 sq. ft. of counter/working bench space, an undercounter refrigerator, 110 sq. ft. feet of locked cabinets, 6.8 sq. ft. of drawer storage space, two internet access ports, a desk and phone, and a sink. The entrance to room 1338 permits visualization of the in ground Kistler force plate (3 ft x 2 ft) in the 60 ft. hallway directly outside this laboratory. All connections to the forceplate feed into room 1338 which houses the designated gait analysis PC computer. A second computer, a portable G3 PowerMac Powerbook, services this laboratory.

Equine Exercise Program

Treadmill and Performance Testing Facility – VMC Galbreath Equine Center

The Ohio State University Equine Exercise Program is comprised of eight Thoroughbred horses conditioned for the treadmill. Horses are exercised on the treadmill three times per week for 15 minutes, increasing to a gallop. Our team includes a Project Director (Dr. Isabel Menendez), an orthopedic surgery resident (Elijah Hothem, MD) and several undergraduate students in animal science and biological sciences (Emily Falk, Carissa Norquest, Leanne Diese, Michelle Bacha, Kristen Zucco, Natalee Ziegler, and Ally Sterman) that care for, cool down, and assist with the horse exercise protocols. These exercised horses are being used in long-term studies to investigate drug absorption from joints. These data will provide new detection parameters that may harmonize withdrawal recommendations in typical sport horses, assisting national and international organizations, such as the United States Equestrian Federation (USEF) and the Federation Equestre Internationale (FEI).

Clinical Trial of Autologous Protein Solution

Our laboratory performed a prospective, randomized, placebo-controlled, double-blinded clinical trial of Autologous Protein Solution (APS) therapy for equine osteoarthritis. APS is an autologous blood product containing high concentrations of platelet-derived growth factors and anti-inflammatory cytokines, and its intra-articular use would be beneficial to reduce the joint inflammation and promote chondrogenesis and chondroprotection. In this clinical trial, 40 equine clinical patients with naturally-occurring osteoarthritis have been enrolled, exercised using treadmill, and treated with intra-articular application of APS. The gaits of these horses have been evaluated by subjective lameness examination, objective gait analysis using force plate, clinical assessments of joint pain and swelling, synovial fluid analysis for cytology and cytokine measurements, radiography, and client questionnaires. The intra-articular APS therapy has shown highly promising therapeutic responses in the equine patients with significantly improvements in lameness grades, gait symmetry, and pain-free range of joint motion.
Textbook Chapters


Refereed Article Publications in the last 3 years (2009-2011) (in print or accepted)
*Denotes first author as a graduate student/fellow/professional student and Dr. Bertone as senior author.


*Akikazu Ishihara, Jeffrey S. Bartlett, Alicia L. Bertone. Inflammation and immune response of intra-articular serotype-2 adeno-associated virus or adenovirus vectors in a large animal model. Accepted Arthritis, 2011.


*Sally E. Henderson BS, Kelly S. Santangelo DVM, and Alicia L. Bertone DVM, PhD. Roles of retinoic acid and a retinoic acid antagonist (LE135) in chondrogenesis of equine bone marrow derived mesenchymal stem cells and chondrocytes. Accepted, Am J Vet Res, 2010.


Activities
Equine Comparative Orthopedic Research

Refereed Article Publications continued


Non-Refereed Journal Article Publications in the Last 3 Years (2009-2011)


Exploring New and “Smaller” Techniques for Treating Osteoarthritis in Horses at the Molecular Level. (Stacey Oke Author, with contributions from AL Bertone) In: 2011

Cells Can Be Engineered to Make Bone and Help Patients (AL Bertone) In: Update for Veterinarians The Ohio State University Veterinary Medical Center. Comparative Orthopedics at the Ohio State Veterinary Medical Center, Sept-Oct, 2010.

Revolutionary Procedure Helps Heal Bones. (Nicole Kraft Author, with contributions from AL Bertone). In: Fall Update, The Ohio State University Veterinary Medical Center, Fall, 2010.


Getting by with a little help from their friends. Julia Harris (author). AL Bertone, Featured Faculty. On Campus. The Ohio State University Faculty Staff newspaper. April 22, 2010, page 6-7.

Scott D. Stanley, PhD and Alicia L Bertone DVM, PhD, Dipl ACVS. Analysis for Drugs of Abuse in Exercised Thoroughbred Horses Treated with EXCEDE® (Ceftiofur Crystalline Free Acid) Pfizer Animal Health Whitepaper, Feb 2010.


Equine Affaire Video; Equine Exercise Program PR material and Informational Interview, 2009

Proceedings Published in the Last 2 Years (2010-2011)


Bertone AL. Subchondral Bone Cysts - In Proceedings, Kentucky Equine Spring Seminar, Kentucky Association of Equine Practitioners, Rolex – 3day, Lexington KY, April, 2011.


Bertone AL. What to do with the Osteoarthritic Lame Horse. Proceedings, SIVE International Congress, Montesilvano, Italy, 2011.


Abstracts Published in the Last 2 Years (2010-2011)


Immunoresponse to allogeneic synovial or xenogenic mesenchymal stromal cells in a coculture model. Tissue Engineering Conference Abstr, DHRLI, Feb 15, 2011.


Chondrogenic potential of human synovial-derived mesenchymal stromal cells as vectors for key growth factors in a co-culture model. SS Jump, EB Skinner, VY Ng, DC Flanigan, AL Bertone. Advances in Veterinary Medicine Research, Book of Abstracts, April 14, CR-10, 2011.


Pharmacokinetics of intra-articular betamethasone sodium phosphate and betamethasone acetate and endogenous hydrocortisone suppression in exercising horses. MI Menendez, MA Phelps, AL Bertone. Advances in Veterinary Medicine Research, Book of Abstracts, April 14, CR-1, 2011.


Immunoresponse to allogeneic synovial or xenogenic mesenchymal stromal cells in a coculture model. S.S. Jump, PhD, D.S. Smith, D.C. Flanigan, MD, and A.L. Bertone, DVM, PhD Advances in Veterinary Medicine Research, Book of Abstracts, April 14, MCB-9, 2011.

Genetically Engineered Juvenile Human Neocartilage Formation in Vitro for Articular Cartilage Implantation. 10th Annual OSUMC Research Day Celebration, BRT, April 7th, 2011.

Immunoresponse to allogeneic synovial or xenogenic mesenchymal stromal cells in a co-culture model. T2C Comprehensive Wound Care Conference, OSU Union, April 8, 2011.

Temporal expression and tissue distribution of interleukin-1b in two strains of guinea pigs with varying propensity for spontaneous knee osteoarthritis. T2C Comprehensive Wound Care Conference, OSU Union, April 8, 2011.


In Vivo High-field 3 Tesla Magnetic Resonance Imaging to assess osteochondral healing in an equine model. Mallory-Coleman Research Day Abstracts, Blackwell Hotel, Ohio State, June 4th, 2010


Abstracts Published Continued

Pharmacokinetics Of Intra-Articular Methylprednisolone Acetate And Endogenous Hydrocortisone Suppression In Exercising Horses. MI Menendez; MA Phelps; AL Bertone. Comparative Orthopaedic Research Laboratory, College of Veterinary Medicine; Division of Pharmaceutics, College of Pharmacy and Department of Pharmacology, College of Medicine, The Ohio State University. SF7

Computed Tomography And In Vivo 9.4 Tesla Magnetic Resonance Imaging As A Comprehensive Tool To Assess Variably Healed 6 And 52 Week Osteochondral Knee Defects. Menendez, M I; Powell, K A; Carlton, M; Bertone, A L. Department of Veterinary Clinical Sciences, College of Veterinary Medicine, 2 Department of Biomedical Informatics, Wright Center of Innovation in Biomedical Imaging, The Ohio State University, Columbus, Ohio Advances in Veterinary Medicine Research Day , Ohio State, (2010) CR-2


Poster Sessions from the Last 2 Years (2010-2011)


Immuinorespons to allogeneic synovial or xenogenic mesenchymal stromal cells in a coculture model. Tissue Engineering Conference Abstr, DHRLI, Feb 15, 2011.

Charaterization of long-term tissue remodeling by collagen type and crossling analysis following full thickness ACL rupture: an in vivo human study Joshua Everhart, David Flanigan, Christopher Kaeding, Alicia Bertone. Trans Orthop Res Soc, Long Beach, Calif, Jan 14, 2011


Activities
Equine Comparative Orthopedic Research

Poster Sessions Continued


Chondrogenic potential of human synovial-derived mesenchymal stromal cells as vectors for key growth factors in a co-culture model. SS Jump, EB Skinner, VY Ng, DC Flanigan, AL Bertone. Advances in Veterinary Medicine Research, Book of Abstracts, April 14, CR-10, 2011.


Pharmacokinetics of intra-articular betamethasone sodium phosphate and betamethasone acetate and endogenous hydrocortisone suppression in exercising horses. MI Menendez, MA Phelps, AL Bertone. Advances in Veterinary Medicine Research, Book of Abstracts, April 14, CR-1, 2011.


Immunoresponse to allogeneic synovial or xenogenic mesenchymal stromal cells in a coculture model. S.S. Jump, PhD, D.S. Smith, D.C. Flanigan,MD, and A.L.Bertone, DVM, PhD Advances in Veterinary Medicine Research, Book of Abstracts, April 14, MCB-9, 2011.

Genetically Engineered Juvenile Human Neocartilage Formation in Vitro for Articular Cartilage Implantation. 10th Annual OSUMC Research Day Celebration, BRT, April 7th, 2011.

Immunoresponse to allogeneic synovial or xenogenic mesenchymal stromal cells in a co-culture model. T2C Comprehensive Wound Care Conference, OSU Union, April 8, 2011.

Temporal expression and tissue distribution of interleukin-1b in two strains of guinea pigs with varying propensity for spontaneous knee osteoarthritis. T2C Comprehensive Wound Care Conference, OSU Union, April 8, 2011.


Awards in the Last 3 Years (2009-2011)

Research Adviser, 2011 Graduation with Honors (Amelia Kaeding, Recipient) Biological Sciences BS degree
Research Adviser, 2011 2nd Place Young Investigator Award ACVP (Kelly Santangelo, recipient)
Cover Reproduction, American Journal of Veterinary Research, Aug 2011–Aug 2012 (Henderson manuscript).
Research Adviser, 2011 Harold W. Casey Scholarship Award, ACVP (Kelly Santangelo, recipient)
Research Adviser, 2011 PEO International Scholar Award for Women (Kelly Santangelo, recipient)
Cover Reproduction, Journal of the Veterinary Medical Association, July 2011 – 2012 (Dougherty manuscript).
Research Adviser, 2011 Travel Award Winner, Medical Center Research Day, BRT, OSU, (Vincent Ng, recipient)
Research Adviser, 2011 Bachelor of Science with Distinction in Research (Amelia Kaeding, recipient)
Research Adviser, 2010 Internship Research Award, Dept of Animal Science (Rebecka Sanchez, recipient).
Research Adviser, 2010 Young Investigator Award (Santangelo, recipient) – 1st Place Natural Disease Category ACVP/ASVCP conference
Research Adviser, 2010 ACVP Travel Award (Santangelo, recipient)
Research Adviser, 2010 Dr William Bussey Summer Scholarship for Research (Holly Helbig CVM 2013, recipient)
Research Adviser, 2010 Ray Travel Award from the Council for Graduate Students Ohio State, (Dr Kelly Santangelo, recipient- to present research at the Brussels Belgium OARSI World Congress).
Research Adviser, 2010 Hall Scholarship Award from Biological Sciences (Amelia Kaeding, recipient)
Research Adviser, 2009 PEO International Scholar Award for Women (Dr Kelly Santangelo, recipient)
Research Adviser, 2009 GlaxoSmithKline & ACVP/STP Coalition Award (Dr Kelly Santangelo, recipient)
Research Adviser, 2009 Burroughs Wellcome – Invitation Speaker Award (Dr Kelly Santangelo, recipient)
Research Adviser, 2009 Dean’s Undergraduate Research Fund Award, (Amelia Kaeding, recipient), Division of Natural and Mathematical Sciences, The Ohio State University.
Research Adviser, 2009 International Scholar Research Exposition Selection, (Dr Maria Menendez, recipient), November 19th, The Ohio State University, Presidents Office.
Research Adviser, 2009 Ray Travel Award to OARSI (Dr Kelly Santangelo Recipient).
Research Adviser, 2009 Merck-Merial-NIH National Veterinary Scholars Symposium Young Investigator Award. (Dr Kelly Santangelo, recipient).
Research Adviser, 2009 Departmental Research Award for best Basic Science Research Publication (Dr Shannon Murray, recipient).
Clinic Adviser, 2009 Veterinary Clinical Sciences Department Resident Award for Clinical Service for Large Animal. (Dr Shannon Murray, recipient)
Seminars in the Last 4 Years (2008-2011)

2011
19 Presentations plus workshop (1) and panels (3)
- TEDx – Lexington, KY – (1)
- SHPI Research Seminar, Martha Morehouse Auditorium, Ohio State Medical Center -(1)
- Merial Ltd – Regenerative Medicine Seminar – Duluth, GA (1) plus (1) panel
- Ohio State Lab Animal Club Lunch Lecture Series – Columbus, OH (1)
- American College of Veterinary Surgeons Symposium, Chicago, ILL (4)
- Duquesne University– Regenerative Medicine Symposium, Pittsburg, PA (1)
- SIVE International Congress –Montesilvano, Italy (7) plus (1) workshop plus (1) panel,
  Kentucky Equine Veterinary Spring Seminar – Rolex 3-day Event Series – (3) plus (1) panel

2010
Presentations plus moderator and panels
- VCS Faculty Professional Development Seminar –The Ohio State University, (1)
- American College of Veterinary Surgeons Symposium, Seattle, WA (2)
- North Eastern Assoc Equine Practitioners Symposium, Groton, CT (3) plus 2 panels
- Purina Equine Conference, St Louis, MO (2) plus Case conference and panel
- VCS Faculty Professional Development Seminar- Regenerative Medicine (1) and Panel Moderator
- Regenerative Medicine and Cell Therapies: Comparative, Veterinary and Applied Programs. Ohio State Retreat. Mohican OH (1) and Session Moderator
- Pall Platelet Therapy Advisory Panel Meeting – Veterinary Applications of PRP (1). Roslyn, NY.
- AO North America – Challenges in Fracture Care Across Disciplines. Phoenix, Az. (1)
- Ohio State Medical Center Alumni Symposium – Cartilage Regeneration (1), Ear and Eye Institute, Ohio State
- Summer Research Program – Brown Bag Lunch Seminar (1) Ohio State CVM, Columbus, OH

2009
Presentations plus moderator
- Clinical Translational Research Panel – Immunology Collaborations. BRT, The Ohio State University, (1)
- The Ohio State University Bone and Joint Interest Group, OSC, 1224 Kinnear Rd, OH (1)
- The Ohio State University Sports Medicine Center 3rd Annual Research Day, BRT, 12th Ave, OH (1)
- Equine Nutrition Conference, The Ohio State University, Columbus, OH (2)
- American College of Veterinary Surgeons Symposium, Washington, DC (3) plus moderator
- VCS Department Research Seminar, The Ohio State University, Columbus, OH (1)
- Japanese Congress on Equine Anesthesia and Surgery – Sapporo Japan (1)
- Japanese Racing Association – Tokyo Japan (1)

2008
Presentations plus workshop
- Faculty Development Research Seminar, VCS Department, Ohio State, Columbus, OH (1)
- Roissey Conference, AVA Emergency and Anesthesia, Paris, France (2) plus
  Workshop Surgery Lab (1)
- Equine Research Group Seminar, Galbreath Equine Conference Room, Columbus, OH (1)
- Ohio State Sports Medicine Center Research Seminar, Martha Morehouse Center, Columbus, OH (1)
- Mallory-Coleman Research Day, Fawcett Center, The Ohio State University, Columbus, OH (1)
- 2nd Annual Sports Medicine Research Day, Biomedical Research Tower, The Ohio State University (1)
- 3rd International Equine Osteochondrosis Symposium, Stockholm Sweden, (1)
- American College of Sports Medicine – Cartilage Regeneration Workshop, Indianapolis, IN (1)
## Funded Research and Scholarships in the Last 3 Years (2009-2011)

<table>
<thead>
<tr>
<th>Year</th>
<th>Organization</th>
<th>Description</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>2011-2012</td>
<td>Biomet Biologics, Inc.</td>
<td>Autologous Solution Derived From Whole Blood in Treatment of Horses with Osteoarthritis. ($291,417)</td>
<td>03/31/11-03/30/12</td>
</tr>
<tr>
<td>2010-2011</td>
<td>PALL Corp.</td>
<td>Pilot study using filtered Platelet Concentration as therapy for OA in dogs. ($35,000)</td>
<td>(06/01/10-05/31/11)</td>
</tr>
<tr>
<td>2010-2011</td>
<td>Biomet Biologics, Inc.</td>
<td>ASC Comparison of BMA Needle Designs. ($79,479.00)</td>
<td>(05/01/10-04/30/11)</td>
</tr>
<tr>
<td>2009-2010</td>
<td>Thoroughbred Charities of America.</td>
<td>Bone Biomarkers in Exercising Thoroughbreds. ($4,000)</td>
<td>04/01/09-03/31/10</td>
</tr>
<tr>
<td>2009-2010</td>
<td>Velcura, Inc.</td>
<td>Pharmacokinetics of a new bone remodeling drug for use in sport horses. ($31,919)</td>
<td>09/15/09-09/14/10</td>
</tr>
<tr>
<td>2009-2010</td>
<td>Pfizer Animal Health.</td>
<td>Pharmacokinetics of a new antibiotic in exercising horses. ($16,833)</td>
<td>09/01/09-08/31/10</td>
</tr>
<tr>
<td>2008-2009</td>
<td>United States Equestrian Federation.</td>
<td>Sensitivity of assays to detect intra-articular medications in exercising horses. ($31,000)</td>
<td>10/01/08 – 09/31/08</td>
</tr>
<tr>
<td>2008-2010</td>
<td>American Quarter Horse Association [Co-PI].</td>
<td>Equine Head Trauma: Correlation of Neuroanatomic Skull Injury and Brain damage using State of the Art 3T MR, Contrast CT and Immunohistochemical Analysis. ($73,596.40)</td>
<td>08-01-08 – 07-31-09</td>
</tr>
<tr>
<td>2008-09</td>
<td>Biodontics, Inc.</td>
<td>Pluripotentiality and Chondrogenic Potency of a new source of stem cells. ($96,295)</td>
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<tr>
<td>2008-10</td>
<td>Sports Medicine Center Intramural Grants Program.</td>
<td>In Vivo MRI Assessment of Genetically Engineered Cartilage ($24,858)</td>
<td>04/01/08 – 03/31/10</td>
</tr>
<tr>
<td>2007-09</td>
<td>Bone Solutions, Inc.</td>
<td>Influence of Bone Cement on Bone-screw Interface In Vivo. ($40,000)</td>
<td>01/01/07 – 12/31/09</td>
</tr>
<tr>
<td>2007-09</td>
<td>American Quarter Horse Foundation.</td>
<td>The Effects of a Steroid and Local Anesthetic Alone, and in Combination, as an Effective Intra-articular Medication in the Diagnosis and Treatment of Lameness in the Horse. ($26,212.49)</td>
<td>01/01/07 – 12/31/09</td>
</tr>
</tbody>
</table>
We appreciate the contributions of all those that are working with the program, with a special thanks to the following students and residents who have volunteered in the lab: Joshua Everhart, Martha Hensel, Sarah Baker, Sally Henderson, Sarah Dougherty and Tonia Minko. Thank you!