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Short presentation

Professor and head of Section of Medicine and Surgery, Department of Veterinary Clinical Sciences with 20 scientific staff members. The research group consists currently of three PhD student, and several MSc and BSc students. Research focus is on cardiovascular adaptations to exercise, often termed "Athlete's Heart" in racehorses with focus on translational perspectives. Especially atrial fibrillation has high interest and the disease is disabling for both horses and people. The horse is an alternative animal model compared to traditionally used models such as rodents and pigs and we show that the horse and human has several similarities regarding this disease. The research with establishing this new animal model has been funded both by the Danish Research Council (2018 and 2021), Marie Curie Horizon 2020 ITN network and Marie Curie Horizon 2020 IF. The studies of atrial fibrillation are ongoing and methods established will be included in future projects.

Collaborations involve both veterinarians, biologist and MDs. Major collaborators include: Prof. Thomas Jespersen (AF and animal models), and assoc. prof. Steen Larsen (myocardial metabolism), Department of Biomedicine, UCPH. Consultant Steen Pehrson and Jacob Tfelt-Hansen, Rigshospitalet (pacemaker implantation and cardiac mapping), Prof. Pyotr Platonov (AF and animal models), University of Lund, Sweden. Prof. Ulrich Schotten and Assoc. prof. Sander Verheule (AF and tissue characterization), Maastricht University, The Netherlands. Assoc. prof. Mathias Hohl, University of Saarland, Germany (histology and biochemistry) Assoc. prof. Halina Dobrzynski (Athlete's Heart), University of Manchester, UK. Prof. Prashanthan Sanders, University of Adelaide, Australia (AF, 3D electroanatomical mapping and exercise).

Career & collegial tasks

Present occupation:

Professor, Faculty of Health and Medical Sciences, University of Copenhagen

Education:

Doctor of Veterinary Medicine (1999)

PhD (2004). Thesis title: Cardiac development assessed by echocardiography in young Standardbred trotters

Employment:

PhD student, Department of Clinical Sciences, Internal Medicine, The Royal Veterinary and Agricultural University (May 1999)

Maternity leave (May 1999 – February 2000)

PhD student, Department of Clinical Sciences, Internal Medicine, The Royal Veterinary and Agricultural University (March 2000-December 2002)

Assistant Veterinarian, Department of Clinical Sciences, Large Animal Surgery, KVL (December 2002-April 2003)

Maternity leave (April 2003-February 2004)

PhD student, Department of Clinical Sciences, Internal Medicine, KVL (March 2004-June 2004)

Assistant Professor, Department of Large Animal Sciences, Medicine and Surgery, Faculty of Life Sciences, University of Copenhagen (June 2004-November 2007)

Associate Professor, Department of Large Animal Sciences, Medicine and Surgery, Faculty of Life Sciences, University of Copenhagen (November 2007 – October 2013)

PhD Coordinator, Department of Large Animal Sciences, Faculty of Life Sciences, University of Copenhagen (April 2009 - present)

Head of Medicine and Surgery at Department of Large Animal Sciences, Faculty of Life Sciences, University of Copenhagen (August 2009 - present)

Professor (MSO), Department of Large Animal Sciences, Faculty of Health and Medical Sciences, University of Copenhagen (October 2013 - present)

Other scientific qualifications:

Reviewer:

- Acta Veterinaria Scandinavia
- Journal of Equine Veterinary Science
- Equine Veterinary Journal
- Veterinary Journal
- Journal of Veterinary Medical Science
- Journal of American Veterinary Medical Association (JAVMA)
- Journal of Veterinary Cardiology

Co-editor:

- Equine Veterinary Journal (2010)

Editorial Board Member:

- BMC Veterinary Research (2012 - present)
- ACVIM board for the ACVIM consensus statement 2013: "Recommendations for equine athletes with cardiovascular abnormalities"
- Dansk Veterinær Tidsskrift (Danish Veterinary Journal) (2012 -present)

Publications; peer reviewed publications; journals and books

Atrial fibrillation as a risk factor for exercise-induced pulmonary haemorrhage following a standardised exercise test

Hansen, Sanni, Dam Otten, Nina, Nissen, Sarah Dalgas, Carstensen, Helena, Hopster-Iversen, Charlotte, Fjeldborg, Julie, Staun, S. H., Fenner, Merle Friederike, Hesselkilde, E. M. & Buhl, Rikke, 2024, (E-pub ahead of print) In: Equine Veterinary Journal.

Structural and electro-anatomical characterization of the equine pulmonary veins: implications for atrial fibrillation

Kjeldsen, Sofie Troest, Nissen, Sarah Dalgas, Saljic, Arnela, Hesselkilde, E. M., Carstensen, Helena, Sattler, Stefan M, Jespersen, Thomas, Dr Linz, Dominik Karl, Hopster-Iversen, Charlotte, Kutieleh, R., Sanders, P. & Buhl, Rikke, 2024, In: Journal of Veterinary Cardiology. 52, p. 1-13

Long-Term Training Increases Atrial Fibrillation Sustainability in Standardbred Racehorses

Carstensen, Helena, Nissen, Sarah Dalgas, Saljic, Arnela, Hesselkilde, E. M., van Hunnik, A., Hohl, M., Sattler, Stefan M, Fløgstad, C., Hopster-Iversen, Charlotte, Verheule, S., Böhm, M., Schotten, U., Jespersen, Thomas & Buhl, Rikke, 2023, In: Journal of Cardiovascular Translational Research. 16, p. 1205–1219

Muscarinic acetylcholine receptors M₂ are upregulated in the atrioventricular nodal tract in horses with a high burden of second-degree atrioventricular block

Nissen, Sarah Dalgas, Saljic, Arnela, Carstensen, Helena, Braunstein, T. H., Hesselkilde, E. M., Kjeldsen, Sofie Troest, Hopster-Iversen, Charlotte, D'Souza, A., Jespersen, Thomas & Buhl, Rikke, 2023, In: Frontiers in Cardiovascular Medicine. 10, 10 p., 1102164.

Atrial fibrillatory rate as predictor of recurrence of atrial fibrillation in horses treated medically or with electrical cardioversion

Buhl, Rikke, Hesselkilde, E. M., Carstensen, Helena, Hopster-Iversen, Charlotte, van Loon, G., Decloedt, A., van Steenkiste, G., Marr, C. M., Reef, V. B., Schwarzwald, C. C., Mitchell, K. J., Nostell, K., Nogradi, N., Nielsen, Søren Saxmose, Carlson, J. & Platonov, P. G., 2022, In: Equine Veterinary Journal. 54, 6, p. 1013-1022 10 p.

Cartilaginous Intrusion of the Atrioventricular Node in a Quarter Horse with a High Burden of Second-Degree AV Block and Collapse: A Case Report

Nissen, Sarah Dalgas, Saljic, Arnela, Kjeldsen, Sofie Troest, Jespersen, Thomas, Hopster-Iversen, Charlotte & Buhl, Rikke, 2022, In: *Animals*. 12, 21, 2915.

Electrocardiographic Changes in a Horse with Induced Myocardial Infarction

Weis, R., Carstensen, Helena, Sattler, Stefan M, Buhl, Rikke & Hesselkilde, E. M., 2022, In: *Animals*. 12, 10, 1272.

Electrocardiographic characteristics of trained and untrained standardbred racehorses

Nissen, Sarah Dalgas, Weis, R., Krag-Andersen, E. K., Hesselkilde, E. M., Isaksen, Jonas L., Carstensen, Helena, Kanters, Jørgen K., Dr Linz, Dominik Karl, Sanders, P., Hopster-Iversen, Charlotte, Jespersen, Thomas, Pehrson, S. & Buhl, Rikke, 2022, In: *Journal of Veterinary Internal Medicine*. 36, 3, p. 1119-1130

A novel approach for obtaining 12-lead electrocardiograms in horses

Hesselkilde, E. M., Isaksen, Jonas L., Petersen, B. V., Carstensen, Helena, Jespersen, Thomas, Pehrson, S., Kanters, Jørgen K. & Buhl, Rikke, 2021, In: *Journal of Veterinary Internal Medicine*. 35, 1, p. 521-531

Atrial fibrillation in horses Part 2: Diagnosis, treatment and prognosis

Decloedt, A., Van Steenkiste, G., Vera, L., Buhl, Rikke & van Loon, G., 2021, In: *Veterinary Journal*. 268, 105594.

Biofilm Research in Bovine Mastitis

Pedersen, Regitze Renee, Krömker, Volker, Bjarnsholt, Thomas, Dahl-Pedersen, Kirstin, Buhl, Rikke & Jørgensen, Elin, 2021, In: *Frontiers in Veterinary Science*. 8, 11 p., 656810.

Detection of atrial fibrillation with implantable loop recorders in horses

Buhl, Rikke, Hesselkilde, E. M., Carstensen, Helena, Fenner, Merle Friederike, Jespersen, Thomas, Tfelt-Hansen, Jacob & Sattler, Stefan M, 2021, In: *Equine Veterinary Journal*. 53, 2, p. 397-403

Evaluation of electrocardiographic repolarization parameters after administration of trimethoprim-sulfadiazine, detomidine, or their combination in horses

Trachsel, D. S., Callø, Kirstine, Jørgensen, Elin, Lunddahl, C. S., Pedersen, P. J., Kanters, Jørgen K., Klærke, Dan Arne & Buhl, Rikke, 2021, In: *American Journal of Veterinary Research*. 82, 3, p. 207-217 11 p.

Exercise-Associated Sudden Death in Finnish Standardbred and Coldblooded Trotters - A Case Series With Pedigree Analysis

Trachsel, D. S., Callø, Kirstine, Mykkänen, A. K., Raistakka, P., Anttila, M., Fredholm, Merete, Tala, M., Lamminpää, K., Klærke, Dan Arne & Buhl, Rikke, 2021, In: *Journal of Equine Veterinary Science*. 104, 103694.

First catheter-based high-density endocardial 3D electroanatomical mapping of the right atrium in standing horses

Hesselkilde, E., Dr Linz, Dominik Karl, Saljic, Arnela, Carstensen, Helena, Kutieleh, R., Jespersen, Thomas, Sanders, P. & Buhl, Rikke, 2021, In: *Equine Veterinary Journal*. 53, 4, p. 186-193

Implantable loop recorders can detect paroxysmal atrial fibrillation in Standardbred racehorses with intermittent poor performance

Buhl, Rikke, Nissen, Sarah Dalgas, Winther, M. L. K., Poulsen, S. K., Hopster-Iversen, Charlotte, Jespersen, Thomas, Sanders, P., Carstensen, Helena & Hesselkilde, E. M., 2021, In: *Equine Veterinary Journal*. 53, 5, p. 955-963

Increased fibroblast accumulation in the equine heart following persistent atrial fibrillation

Saljic, Arnela, Fenner, Merle Friederike, Winters, J., Flethøj, M., Eggert Eggertsen, C., Carstensen, Helena, Nissen, Sarah Dalgas, Melis Hesselkilde, E., van Hunnik, A., Schotten, U., Sørensen, U., Jespersen, Thomas, Verheule, S. & Buhl, Rikke, 2021, In: *IJC Heart and Vasculature*. 35, 100842.

Inhibition of Small-Conductance Calcium-Activated Potassium Current ($I_{K, Ca}$) Leads to Differential Atrial Electrophysiological Effects in a Horse Model of Persistent Atrial Fibrillation

Fenner, Merle Friederike, Gatta, G., Sattler, Stefan M, Kuiper, M., Hesselkilde, E. M., Adler, Ditte Marie Top, Smerup, Morten Holdgaard, Schotten, U., Sørensen, U., Diness, J. G., Jespersen, Thomas, Verheule, S., Van Hunnik, A. & Buhl, Rikke, 2021, In: *Frontiers in Physiology*. 12, 614483.

Intrinsic Electrical Remodeling Underlies Atrioventricular Block in Athletes

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RNA-sequencing and immunofluorescence of the myotendinous junction of mature horses and humans

Jakobsen, J. R., Schjerling, Peter, Svensson, R. B., Buhl, Rikke, Carstensen, Helena, Koch, M., Rindom Krogsgaard, M. R., Kjær, Michael & Mackey, Abigail, 2021, In: *American journal of physiology. Cell physiology*. 321, p. C453–C470

Relationship between atrial fibrillatory rate based on analysis of a modified base-apex surface electrocardiogram analysis and the results of transvenous electrical cardioversion in horses with spontaneous atrial fibrillation

Van Steenkiste, G., Carlson, J., Decloedt, A., Vera, L., Buhl, Rikke, Platonov, P. G. & van Loon, G., 2021, In: *Journal of Veterinary Cardiology*. 34, p. 73-79 7 p.

Thoracotomy and Pericardiectomy for Access to the Heart in Horses: Surgical Procedure and Effects on Anesthetic Variables

Adler, Ditte Marie Top, Hopster, K., Hopster-Iversen, Charlotte, Fenner, Merle Friederike, Buhl, Rikke & Jacobsen, Stine, 2021, In: *Journal of Equine Veterinary Science*. 96, 103315.

Atrial fibrillation in horses part 1: Pathophysiology

Decloedt, A., Van Steenkiste, G., Vera, L., Buhl, Rikke & van Loon, G., 2020, In: *Veterinary Journal*. 263, 105521.

Comparison of Tenocyte Populations from the Core and Periphery of Equine Tendons

Zhang, C., Svensson, R. B., Montagna, C., Carstensen, Helena, Buhl, Rikke, Schoof, E. M., Kjær, Michael, Magnusson, Stig Peter & Yeung, C. Y. C., 2020, In: *Journal of Proteome Research*. 19, 10, p. 4137-4144 8 p.

Effect of Selective IK_{ACh} Inhibition by XAF-1407 in an Equine Model of Tachypacing-induced Persistent Atrial Fibrillation (AF)

Fenner, Merle Friederike, Carstensen, Helena, Nissen, Sarah Dalgas, Hesselkilde, E. Z., Lunddahl, C., Jensen, M. A. H., Loft-Andersen, A. V., Sattler, Stefan M, Platonov, P. G., El-Haou, S., Jackson, C., Tang, R., Kirby, R., Ford, J. W., Schotten, U., Milnes, J. T., Sørensen, U. S., Jespersen, Thomas & Buhl, Rikke, 2020, In: *British Journal of Pharmacology*. 177, 16, p. 3778-3794

Miltbrandsemfysem hos kvæg – en kasuistik

Martiny, K., Buhl, Rikke, Damborg, Peter Panduro & Agerholm, Jørgen Steen, 2020, In: *Dansk Veterinaertidsskrift*. 2020, 6, p. 18-22

Når hestehjertet får stød: behandling af atrieflimmer med elektrisk konvertering

Buhl, Rikke, Hesselkilde, E. M., Carstensen, Helena, Nissen, Sarah Dalgas & Hopster-Iversen, Charlotte, 2020, In: *Dansk Veterinaertidsskrift*. 2020, 5, p. 30-34

Pulmonary vein firing initiating atrial fibrillation in the horse: Oversized dimensions but similar mechanisms

Dr Linz, Dominik Karl, Hesselkilde, E., Kutieleh, R., Jespersen, Thomas, Buhl, Rikke & Sanders, P., 2020, In: *Journal of Cardiovascular Electrophysiology*. 31, 5, p. 1211-1212

Effect of Selective IK_{ACh} Inhibition by XAF-1407 in an Equine Model of Tachypacing-induced Persistent Atrial Fibrillation (AF)

Jespersen, Thomas, Fenner, Merle Friederike & Buhl, Rikke, 2019, In: *Acta Physiologica*. 227, S721, p. 96-96

Effects of dofetilide and ranolazine on atrial fibrillatory rate in a horse model of acutely induced atrial fibrillation

Carstensen, Helena, Hesselkilde, E. Z., Haugaard, M. M., Flethøj, M., Carlson, J., Pehrson, S., Jespersen, Thomas, Platonov, P. G. & Buhl, Rikke, 2019, In: *Journal of Cardiovascular Electrophysiology*. 30, 4, p. 596-606

Implantable loop recorders for arrhythmia detection - a new promising diagnostic tool for longterm arrhythmia monitoring
Hesselkilde, E. Z., Carsten, H., Fenner, Merle Friederike, Jespersen, Thomas, Tfelt, J., Sattler, Stefan M & Buhl, Rikke, 2019, In: Acta Physiologica. 227, S721, p. 93-93 35.

Longitudinal study of electrical, functional and structural remodelling in an equine model of atrial fibrillation
Hesselkilde, E. Z., Carstensen, Helena, Flethøj, M., Fenner, Merle Friederike, Kruse, D. D., Sattler, Stefan M, Tfelt-Hansen, Jacob, Pehrson, S., Braunstein, T. H., Carlson, J., Platonov, P. G., Jespersen, Thomas & Buhl, Rikke, 2019, In: BMC Cardiovascular Disorders. 19, 1, 12 p., 228.

Antiarrhythmic Effects of Combining Dofetilide and Ranolazine in a Model of Acutely Induced Atrial Fibrillation in Horses
Carstensen, Helena, Kjær, L., Haugaard, M. M., Flethøj, M., Hesselkilde, E. Z., Kanters, Jørgen K., Pehrson, S., Buhl, Rikke & Jespersen, Thomas, Jan 2018, In: Journal of Cardiovascular Pharmacology. 71, 1, p. 26-35 10 p.

Effect of induced chronic atrial fibrillation on exercise performance in Standardbred trotters
Buhl, Rikke, Carstensen, Helena, Hesselkilde, E. Z., Klein, B. Z., Hougaard, K. M., Ravn, K. B., Loft-Andersen, A. V., Fenner, Merle Friederike, Pipper, C. & Jespersen, Thomas, 2018, In: Journal of Veterinary Internal Medicine. 32, 4, p. 1410-1419 10 p.

Effects of trimethoprim-sulfadiazine and detomidine on the function of equine $K_v11.1$ channels in a two-electrode voltage-clamp (TEVC) oocyte model
Trachsel, D. S., Tejada, M. A., Groesfjeld Christensen, V., Pedersen, P. J., Kanters, Jørgen K., Buhl, Rikke, Callø, Kirstine & Klærke, Dan Arne, 2018, In: Journal of Veterinary Pharmacology and Therapeutics. 41, 4, p. 536-545 10 p.

Time-dependent antiarrhythmic effects of flecainide on induced atrial fibrillation in horses
Carstensen, Helena, Hesselkilde, E. Z., Fenner, Merle Friederike, Loft-Andersen, A. V., Flethøj, M., Kanters, Jørgen K., Sattler, Stefan M, Tfelt-Hansen, Jacob, Pehrson, S., Jespersen, Thomas & Buhl, Rikke, 2018, In: Journal of Veterinary Internal Medicine. 32, 5, p. 1708-1717 10 p.

Effect of flecainide on atrial fibrillatory rate in a large animal model with induced atrial fibrillation
Hesselkilde, E. Z., Carstensen, Helena, Haugaard, M. M., Carlson, J., Pehrson, S., Jespersen, Thomas, Buhl, Rikke & Platonov, P. G., Dec 2017, In: BMC Cardiovascular Disorders. 17, 6 p., 289.

Molecular cloning and functional expression of the K^+ channel $K_v7.1$ and the regulatory subunit KCNE1 from equine myocardium: [Inkl. corrigendum]
Pedersen, P. J., Thomsen, K. B., Flak, J. B., Tejada, M. D. L. A., Hauser, Frank, Trachsel, D. S., Buhl, Rikke, Kalbfleisch, T., DePriest, M. S., MacLeod, J. N., Callø, Kirstine & Klærke, Dan Arne, Aug 2017, In: Research in Veterinary Science. 113, p. 79-86 8 p.

Appropriate threshold levels of cardiac beat-to-beat variation in semi-automatic analysis of equine ECG recordings
Madsen, M. F., Kanters, Jørgen K., Pedersen, P. J., Haugaard, M. M., Carstensen, Helena, Olsen, Lisbeth Høier & Buhl, Rikke, 28 Nov 2016, In: BMC Veterinary Research. 12, 10 p., 266.

Left Ventricular Function After Prolonged Exercise in Equine Endurance Athletes
Flethøj, M., Schwarzwald, C. C., Haugaard, M. M., Carstensen, Helena, Kanters, Jørgen K., Olsen, Lisbeth Høier & Buhl, Rikke, Jul 2016, In: Journal of Veterinary Internal Medicine. 30, 4, p. 1260-1269 10 p.

Characterization and differentiation of equine experimental local and early systemic inflammation by expression responses of inflammation-related genes in peripheral blood leukocytes
Vinther, A. M. L., Heegaard, P. M. H., Skovgaard, K., Buhl, Rikke, Andreassen, S. M. & Andersen, P. H., 1 Jun 2016, In: BMC Veterinary Research. 12, 13 p., 83.

Changes in heart rate, arrhythmia frequency, and cardiac biomarker values in horses during recovery after a long-distance endurance ride
Madsen, M. F., Kanters, Jørgen K., Haugaard, M. M., Pedersen, P. J., Carstensen, Helena, Balling, J. D., Olsen, Lisbeth Høier & Buhl, Rikke, 1 May 2016, In: Journal of the American Veterinary Medical Association. 248, 9, p. 1034-1042 9 p.

Pharmacological inhibition of I-K1 by PA-6 in isolated rat hearts affects ventricular repolarization and refractoriness

Skarsfeldt, M. A., Carstensen, Helena, Skibsbye, L., Tang, C., Buhl, Rikke, Bentzen, Bo Hjorth & Jespersen, Thomas, Apr 2016, In: *Physiological Reports*. 4, 8, 11 p., e12734.

Differences in the electrocardiographic QT interval of various breeds of athletic horses during rest and exercise

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Pharmacologic inhibition of small-conductance calcium-activated potassium (SK) channels by NS8593 reveals atrial antiarrhythmic potential in horses

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Acquired pulmonic stenosis due to a compressing intrathoracic abscess in a Thoroughbred yearling

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Action potential repolarization in equine hearts

Callø, Kirstine, Pedersen, P. J., Tejada, M. D. L. A., Poulsen, K. L., Grubb, Søren, Buhl, Rikke & Klærke, Dan Arne, 2015, In: *Biophysical Journal*. 108, 2, Supplement 1, p. 113a 1 p.

Antiarrhythmic and electrophysiologic effects of flecainide on acutely induced atrial fibrillation in healthy horses

Haugaard, M. M., Pehrson, S., Carstensen, Helena, Madsen, M. F., Hesselkilde, E. Z., Præstegaard, K. F., Diness, J. G., Grunnet, M., Jespersen, Thomas & Buhl, Rikke, 2015, In: *Journal of Veterinary Internal Medicine*. 29, 1, p. 339-347 9 p.

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Acute exercise does not induce an acute phase response (APR) in Standardbred trotters

Kristensen, L., Buhl, Rikke, Nostell, K., Bak, L., Petersen, E., Lindholm, M. & Jacobsen, Stine, 2014, In: *Canadian Journal of Veterinary Research*. 78, p. 97-102 6 p.

Cardiac arrhythmias and electrolyte disturbances in colic horses

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Diurnal modulation and sources of variation affecting ventricular repolarization in Warmblood horses

Pedersen, P. J., Moeller, S. B., Madsen, M. F., Kanters, Jørgen K., Buhl, Rikke & Klærke, Dan Arne, 2014, In: *Journal of Veterinary Cardiology*. 16, 4, p. 265-276 12 p.

Recommendations for management of equine athletes with cardiovascular abnormalities

Reef, V. B., Bonagura, J., Buhl, Rikke, McGurrin, M. K. J., Schwarzwald, C. C., Loon, G. V. & Young, L. E., 2014, In: *Journal of Veterinary Internal Medicine*. 28, 3, p. 749-761 13 p.

Normal electrocardiographic QT interval in race-fit Standardbred horses at rest and its rate dependence during exercise

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Cardiac arrhythmias in standardbreds during and after racing: possible association between heart size, valvular regurgitations, and arrhythmias

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Evaluation of clinical and electrocardiographic changes during the euthanasia of horses

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Building a platform for diagnosing long QT syndrome in the horse. Fundamental and clinical pharmacology

Pedersen, P., Kanters, Jørgen K., Klærke, D. A. & Buhl, Rikke, 2011, In: Fundamental and Clinical Pharmacology. 25, 6, p. III-III 1 p.

Cardiac arrhythmias in clinically healthy showjumping horses

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Prevalence of exercise-associated arrhythmias in normal performing dressage horses

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Jugular venous pooling during lowering of the head affects blood pressure of the anesthetized giraffe

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Bakteriel endokarditis hos hest: en kasuistik

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Memberships of boards, networks and alike

Activities