

INVITATION PUBLIC DEFENSE

Radiofrequency catheter ablation as a new treatment for supraventricular tachyarrhythmias in horses

Eva Buschmann

30/09/2025

PROMOTORS

Prof. dr. Gunther van Loon
Faculty of Veterinary Medicine, UGent

Prof. dr. Annelies Decloedt
Faculty of Veterinary Medicine, UGent

Prof. dr. Mattias Duytschaever
AZ Sint-Jan, Bruges

Curriculum Vitae

Eva Buschmann was born on July 21, 1996 in Antwerp. After completing secondary education at the Bisschoppelijk College in Veurne, studying Latin-sciences, she started studying Veterinary Medicine at Ghent University in 2014. In 2020, she obtained her Master's degree in Veterinary Medicine (equine track) with the highest distinction.

After graduation, she joined the Equine Cardioteam Ghent at the Department of Internal Medicine, Reproduction and Population Medicine as a doctoral researcher with funding from the Special Research Fund (BOF, UGent) under the supervision of Prof. dr. Gunther van Loon and Prof. dr. Annelies Decloedt, in collaboration with Prof. dr. Mattias Duytschaever. In November 2021, Eva received a grant from the Research Foundation Flanders (FWO, 1SE9122N) to conduct her research into novel catheter-based diagnostic and therapeutic options for arrhythmias in horses. She combined her doctoral research with participation in the cardiology service of the Clinic of Equine Internal Medicine. Eva also contributed to the supervision of practical sessions, master's theses and clinical education for the students of the 1st, 2nd and 3rd Master of Veterinary Medicine.

Eva is 1st author of eight and co-author of eight peer-reviewed articles in international AI journals. She presented her work at eight international conferences and was co-author of another 15 presentations. At the AVEF conference in 2022, she won the 'AVEF scientific poster award' for the best scientific poster.

Where?

The defense will take place on **Tuesday 30th of September 2025, at 16:30.**

Auditorium A (Entrance 12)

Faculty of Veterinary Medicine
Ghent University, Campus Merelbeke
Salisburylaan 133, Merelbeke

After the defence a reception will take place in the Resto of the faculty, accompanied with drinks and bites.

The defence can also be followed online through Teams-meeting.

How to attend?

If you would like to attend the reception or follow the defence online, please register before September 20th via eva.buschmann@ugent.be.

Members of the Jury

Prof. dr. Siska Croubels
Chairman of the Jury
Faculty of Veterinary Medicine, UGent

Prof. dr. Pascale Smets
Secretary of the Jury
Faculty of Veterinary Medicine, UGent

Prof. dr. Jan De Pooter
Faculty of Medicine and Health Sciences, UGent

Prof. dr. Natasja De Groot
Erasmus Medical Center, Rotterdam

Prof. dr. Rikke Buhl
Faculty of Health and Medical Sciences, University of
Copenhagen

Summary

Supraventricular tachyarrhythmias are common in horses and pose a risk to both equine welfare and rider safety. Pharmacological or electrical cardioversion is currently used to treat atrial tachycardia and atrial fibrillation, but this approach leaves the arrhythmogenic tissue intact, making horses prone to recurrence. At present, no treatment options are available for frequently occurring premature atrial complexes or accessory pathways in horses.

Until now, the diagnosis of arrhythmias in horses has largely relied on surface electrocardiography, which can define the type of arrhythmia but does not provide insight into the mechanism or location of the arrhythmia. Invasive electrophysiological studies are needed for further investigation. In horses, advanced electrophysiological studies remained unexplored until recently due to limited imaging options. Recent developments in three-dimensional electro-anatomical mapping (3D EAM) in horses open new possibilities for more detailed electrophysiological studies. With the 3D EAM system, catheter positions in the heart can be visualised in real time without the need for additional imaging modalities, allowing precise identification of the arrhythmia's origin. This paves the way for radiofrequency catheter ablation, in which targeted scar tissue is created to permanently eliminate the arrhythmia. Because horses have a large heart, thick myocardial walls, and high blood flow, ablation settings must be adapted to achieve durable and safe lesions.

The general aim of this PhD was to develop novel catheter-based diagnostic and therapeutic techniques for supraventricular tachyarrhythmias in horses. Mapping techniques, including multiple catheter recording and 3D EAM, were adapted for use in horses to unravel the underlying mechanism and origin of arrhythmias. In addition, to provide a permanent treatment for arrhythmias, the optimal ablation approach was determined. The final aim was to implement these techniques in the treatment of naturally-occurring arrhythmias in horses.

Multiple catheter recording in sinus rhythm and during right and left atrial pacing resulted in characteristic activation patterns. This can aid in identifying the origin of arrhythmia and opens up possibilities for electrophysiological studies in the standing horses. To optimise treatment by ablation, the effect of radiofrequency settings on lesion dimensions in equine myocardium using an in vitro model were described. To further optimise lesion formation, and thereby reducing recurrence risk, contact force-sensing catheters and the ablation index were used to isolate the caudal vena cava and pulmonary veins. The experience gained in these studies allowed to apply these techniques to diagnose and treat several types of naturally-occurring arrhythmias in clinical patients. Both impedance-based and magnetic-based 3D EAM systems were used and provided insights into the origin and mechanisms of arrhythmias. Typical atrial flutter in horses was identified as a macro-reentry circuit in the caudal right atrium. Caudal vena cava isolation, guided by the ablation index or lesion size index was effective to provide long-term freedom of atrial tachycardia in all horses. Furthermore, the mid right atrial free wall was identified as a predilection site of frequent premature atrial complexes in three horses, with a successful ablation performed in one horse. Electrocardiographic findings of accessory pathways in seven horses were described and were identified by 3D EAM in two horses. Although still challenging, ablation might provide a permanent solution for premature atrial complexes and accessory pathways. Challenges were mainly related to the thick equine myocardial wall and techniques to create deeper lesions should be investigated. Finally, the first experiences to reduce arrhythmogenic substrate in horses with recurrent, persistent atrial fibrillation by 3D EAM and radiofrequency catheter ablation were described, and indicated that recurrence was still observed. More research about the pathophysiology of equine atrial fibrillation is required to develop a targeted treatment. This PhD shows that mapping and ablation of supraventricular arrhythmias in horses is a highly promising technique to provide a permanent treatment.