

Ultrasound-compatible 3D model of the equine heart

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Organisation

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SCOPE OF THE METHOD

The Method relates to	Animal health
The Method is situated in	Education and training, Translational - Applied Research
Type of method	In chemico

DESCRIPTION

Method keywords

Phantom
Echocardiography
3D model
3D printing

Scientific area keywords

Equine Cardiology

interventional cardiology
Cardiac electrophysiology
veterinary medicine
Veterinary education

Method description

In contrast to human medicine, standard imaging techniques for cardiac interventions, namely fluoroscopy, CT and MRI, cannot be used in horses because the size of their thorax is too large for the gantry (CT and MRI) or results in insufficient detail (fluoroscopy). Therefore, echocardiography is essential as an imaging technique for diagnosis of cardiac disease and guidance of intracardiac catheterisations in equine cardiology. A 3D model of the equine heart compatible with ultrasound imaging has been developed based on a 3D computer model acquired from CT imaging of the heart of a pony. Placed in a watertank with silicone windows, equine echocardiography can be simulated and catheters can be introduced and manipulated to simulate intracardiac interventions. The model is therefore useful in the professional education of echocardiography (in the context of specialist training) and development of intracardiac interventions guided by echocardiography. This way, the number of horses used in education can be reduced, catheter manipulations can be trained in the context of specialist training and novel intracardiac therapies with appropriate devices and imaging guidance can be developed *in vitro* before applying them in live horses.

Lab equipment

- Water tank with silicone windows
- Ultrasound unit
- Optional: Catheters for intracardiac interventions

Method status

Still in development

PROS, CONS & FUTURE POTENTIAL

Advantages

- Anatomically correct representation of a healthy equine heart

- Development and training of cardiac interventions before application in live horses
- Education of echocardiography in safe environment

Challenges

- No flow, which can influence catheter manipulations
- No heart contractions, which can influence catheter manipulations and limits education of functional echocardiography
- No valves, which can influence catheter manipulations and are important landmarks in echocardiography

Modifications

A pumping system could be connected to simulate flow.

Future & Other applications

Similar models could be created including pathological conditions, and could be used in veterinary education and simulation of repair interventions.

REFERENCES, ASSOCIATED DOCUMENTS AND OTHER INFORMATION

Links

[Equine Cardioteam](#)

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