Replacing animals
used in scientific research

Computer assisted learning

Replacing animals used in scientific research

Scientists are busy developing some really exciting high-tech methods to replace the use of many animals in scientific research and teaching, like organs-on-a-chip, advanced animal mannequins and computer assisted learning.

replacement: where possible, replacing animal use with alternative techniques

## What problem are scientists trying to solve?

Animal physiology and anatomy are an important part of studies that prepare students for a career involving animals, such as veterinary medicine, animal science, or zoology. In these programs students work with euthanised animals to dissect, or anaesthetised animals to study.

The use of computer assisted learning

Computer assisted learning (CAL) resources, such as CALShare developed by Massey University's veterinary school, provide students with on-line access to biological, anatomical, clinical and physiological learning resources, including videos, tutorials and interactive demonstrations. These features make CAL resources much more powerful than a textbook alone and, importantly, allow them to replace many animals used in teaching.
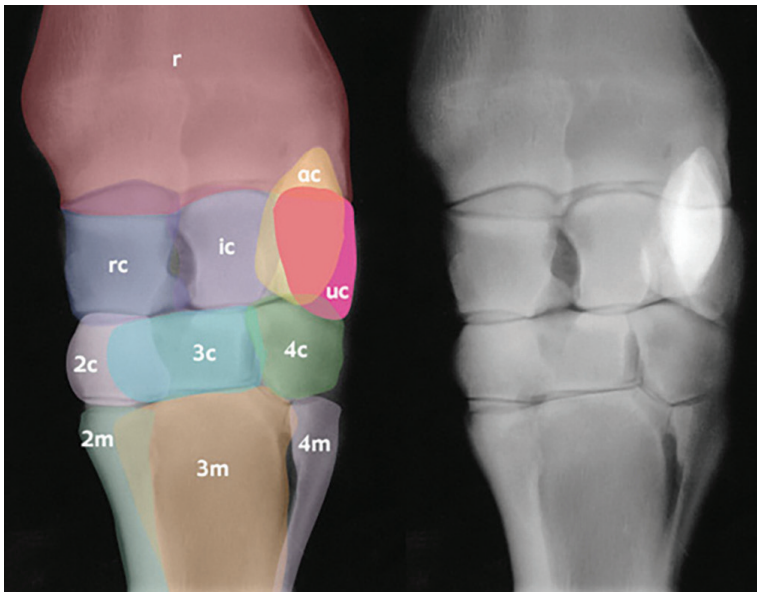
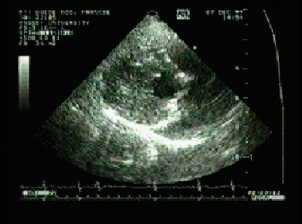Coloured overlays show bones which are often obscured in a real x-ray.

Alive and Beating
Studying the heart
of a normal living dog

Topography

Radiography

Echocardiology

Auscultation

Fluoroscopy   Credits

A Case Study   Objectives

ECHOCARDIOLOGY OF THE HEART   INDEX

To appreciate two-dimensional echocardiography, normal three-dimensional cardiovascular anatomy must first be understood. Only then can images in various planes be interpreted.

This movie is made with the scanner head in the right parasternal position, in the 4th to 5th intercostal space. This gives a "long axis, 4 chambered view", showing the apex on the left and the base of the heart on the right.
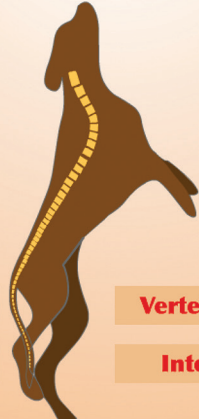
Click the two buttons below for an interpretation of this movie.

ULTRASOUND SCAN KEY

SCAN ASPECT

A virtual clinical study of the heart of a dog using the tools that are typically used in a clinical examination. Resource from: www.calshare.massey.ac.nz/index.html
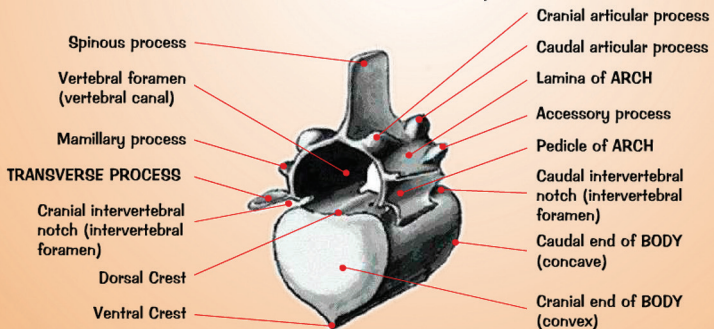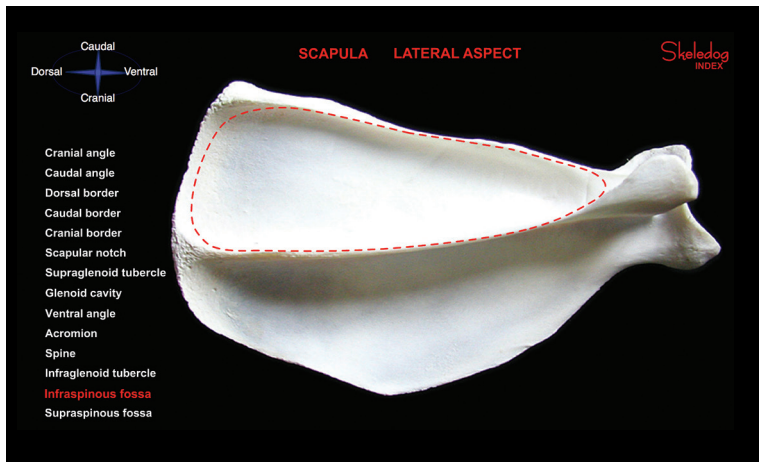
Interactive graphics allow review and revision with more detail than can usually be achieved by fresh dissection. Resource from: www.calshare.massey.ac.nz/index.html

The virtual dissection of a dog skeleton by selecting each bone and examining it at high resolution including detailed anatomical features. Resource from: www.calshare.massey.ac.nz/index.html

Advantages

- It reduces the number of animals used in teaching.
- Viewing on-line resources allow students to become more familiar with a procedure before trying it on real patients (for example surgery for veterinary students).
- Material can be revised repeatedly, improving knowledge retention and skill development, without the use of animals.
- It enables self-paced and independent learning.
- It can be accessed remotely (for example at home, in the lab, or in the field).

Disadvantages

- Some skills cannot be taught adequately using CAL alone.
- Relies on access to suitable computing power and internet connectivity.
- CAL software development is labour intensive.

References

Towards a Humane Veterinary Education. Martinsen S and Jukes N (2016). *Journal of Veterinary Medical Education 43*, No. 4. DOI: www.dx.doi.org/10.3138/jvme.32.4.454

Design and Validation of a Computer-Aided Learning Program to Enhance Students' Ability to Recognize Lameness in the Horse (2014). Barstow, A., Pfau, T., Bolt, D. M., Smith, R. K., & Weller, R. *Journal of veterinary medical education,* 41(1), 1–8. www.jvme.utpjournals.press/doi/abs/10.3138/jvme.0213-040R1

Helpful links

www.calshare.massey.ac.nz/index.html

www.awic.nal.usda.gov/alternatives/alternatives-education

www.vanat.cvm.umn.edu/index.html

www.interniche.org

For further information

ANZCCART

c/o Royal Society Te Apārangi
PO Box 598, Wellington 6140, New Zealand
Phone: +64 4 472 7421
Email: anzccart@royalsociety.org.nz

www.anzccart.org.nz

Ministry for Primary Industries

PO Box 2526, Wellington 6140, New Zealand
Email: animalwelfare@mpi.govt.nz

www.mpi.govt.nz/animals-in-research-testing-teaching