

## Anatomy at CAHID

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The MSc in Medical Art is a unique Master's Programme which combines Anatomy with Art & Design.



A soft-fixed Thiel cadaver used as a model for the development of novel medical ultrasound technology.

## Introduction

In CAHID anatomy sits closely alongside forensic anthropology, medical and forensic art and human identification, and our collaborators include surgeons, designers, computer scientists, engineers and police officers. The synergy between these varied disciplines drives our anatomy research and teaching.

CAHID is led by Sue Black, Professor of Anatomy and Forensic Anthropology, flanked by Roger Soames, Cox Professor of Anatomy and Caroline Wilkinson, Professor of Craniofacial Identification. Our number of staff has gradually increased and CAHID currently has 12 academic staff, 2 Postdoctoral researchers, ca. 20 PhD students, 1 scientific officer, 3 technical staff and 2 admin staff. Many of our PhD students also act as demonstrators during dissection classes.

This year will see the launch of our innovative MSc in Anatomy and Advanced Forensic Anthropology, which joins our existing MSc in Human Anatomy in providing full body dissection. Many of these students continue to do a PhD in a clinically relevant anatomical subject.

Since the introduction of Thiel embalming we increasingly work with clinicians and engineers to use, develop and validate Thiel cadavers as models for research and development of novel equipment and procedures, and for training and demonstration.

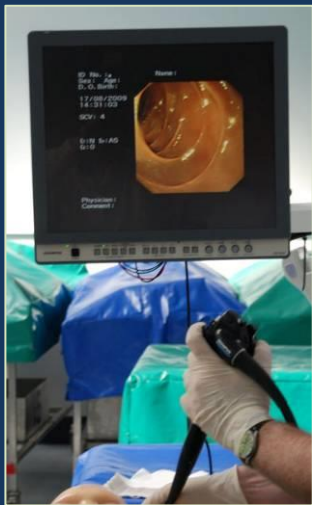
We are developing innovative teaching methods such as haptic computer models to complement dissection, and are extending the use of soft embalmed cadavers to teach anatomy, clinical and surgical procedures. These new teaching methods are utilised at all levels from undergraduates to experienced surgeons, to students and practitioners in medicine, dentistry, science, engineering, surgery, physiotherapy and art.

## Showcase



Facial reconstruction uses anatomical knowledge of facial muscles and other soft tissues to infer the face from the shape of the skull.

## Showcase



Endoscopy on a Thiel cadaver - pilot study by Dr Elaine Henry (NHS Tayside).



Angiogram on a Thiel cadaver - research by Prof. Andreas Melzer (director of IMSAT) and Prof. Graeme Houston (Chair of Clinical Imaging, Ninewells Hospital and Medical School)

# Thiel Embalming

In 2009 CAHID started a pilot with Thiel embalming which was met with very positive responses. In 2012 our new mortuary came into use and since then all of our cadavers (50-70 per year) have been Thiel embalmed. This long-term preservation method provides cadavers with life-like tissue quality and has greatly expanded and diversified the use of our cadavers.

While our formalin cadavers were almost solely used for student dissection we now regularly facilitate cadaver-based training in surgical and clinical procedures and other forms of professional tuition. This covers a wide range of disciplines including training in orthopaedics, laparoscopy, plastic surgery and airway management.

We work closely with researchers in the College of Medicine, Dentistry and Nursing, and the School of Engineering, to further develop the use of Thiel cadavers as a model for their research and development work. We are working towards optimising the embalming and selection process for individual cadaver applications.

The diverse range of R&D projects include ultrasound guided regional anaesthesia, MR guided focused ultrasound, robotic surgery, establishment of flow in vascular segments for interventional vascular procedures, and a range of novel tissue characterisation techniques.

Professor Roger Soames, Dr Roos Eisma and Dr Paul Felts support this work with research into the effects of Thiel embalming on different tissues. This research employs methods such as histology, mechanical testing and elastography, working closely with scientists based in Engineering and Medical Ultrasound groups.

Validation studies have been done for procedures such as MR imaging, ultrasound imaging and for liver displacement during ventilation. The results strengthen the use of Thiel cadavers as a model in pre-clinical studies and facilitate translation of the results into clinical trials.

More qualitative studies compare the experience of surgeons working with Thiel cadavers to those using other models such as animals or formalin embalmed cadavers. Generally, it is found that the appearance and handling of the organs and tissues in Thiel cadavers closely resembles that of a living patient.

## New mortuary



CAHID's new mortuary houses specially designed equipment for Thiel embalming

## Facilitating training



Training in orthopaedic procedures

# Anatomy Research

Our research includes subjects such as anatomical morphology and variation, early development of skeletal structures, and anatomical features relevant to Human Identification.

Professor Roger Soames and Dr Clare Lamb have an interest in functional and clinical anatomy and lead a number of dissection-based studies of clinically relevant anatomy. These include, for example, studies of the arterial supply of the sciatic nerve, anatomy and function of hindfoot ligaments, cutaneous innervation of the hand, and anatomical analysis and management of shoulder impingement syndrome.

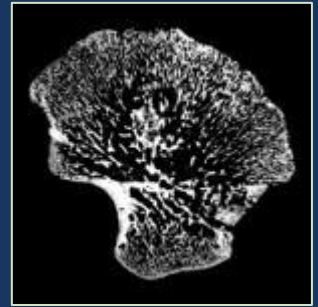
Dr Craig Cunningham uses our Scheuer Collection of juvenile skeletal remains to study the early development of the skeleton and the corresponding changes in structural architecture.

Professor Caroline Wilkinson heads the research group looking at craniofacial identification, with research in areas such facial crease patterns, craniofacial reconstruction, dental pattern and lip morphology and transsexual face changes related to testosterone treatment.

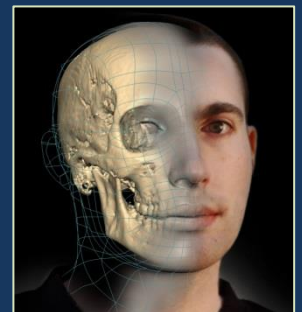
Many staff within CAHID are active in forensic case work and their research focuses on anatomy relevant to human identification.

Professor Sue Black and Dr Helen Meadows lead a number of research studies looking at superficial features such as vein patterns, nails, folds and scars. Patterns of the superficial veins on the dorsum of the hand can be used as an aid to forensic human identification in cases where there is limited identifiable information within a digital image.

Professor Sue Black and Dr Lucina Hackman research skeletal development relevant to age assessment in living individuals, including the effects that diseases and their treatments can have on this development, and the use of imaging methods to assess skeletal properties.



The structural architecture of the developing skeleton provides insight into how the internal bone structure changes in response to normal developmental milestones such as the attainment and maturation of walking and puberty.



How do hormones, bones and muscles work together in the creation of masculine faces?

# Collections



CAHID is home to the Scheuer Collection, a unique repository of juvenile skeletal material. CPD courses utilising this collection are held during the summer. The collection is also available as CT and laser scans.

We have a growing collecting of comparative osteology material, focusing on common British animals. A colony of Dermestid beetles facilitates the preparation of new specimens.



Hundreds of volunteers have contributed to our database of hand images. These images are used to study the uniqueness of features such as the pattern of superficial veins.

# Anatomy Teaching

We teach anatomy through intensive hands-on full-body dissection courses, with typically 4 students per cadaver, in our bright modern Anatomy Lab.

For the past 3 years our MSc students have dissected Thiel embalmed cadavers and as of September 2013 this will be extended to all undergraduate and postgraduate students, completely replacing formalin cadavers.

We teach ca. 180 medical students in each year group. A new medical curriculum was introduced in 2012 and the students now study anatomy in their first, second and third year. The cadavers used by the medical students are shared with the 80 first year dentistry students, who focus on head and neck anatomy.

We provide two gross anatomy modules for third year students in Anatomical Sciences or Forensic Anthropology, who are joined by our students on the MSc in Human Anatomy or on the new MSc in Anatomy and Advanced Forensic Anthropology, and by BSc medical students who do an intercalating year – forming a class of around 100 students.

Less intensive anatomy modules are provided to our students on the Medical or Forensic Art MSc, and to students on an MSc in Biomedical Engineering. Professional groups, such as physiotherapists and surgeons, use our facilities to refresh and extend their anatomy knowledge.

We are increasingly using the flexibility of the Thiel cadavers to enhance the links between anatomy and clinical practice. Medical students now have opportunities to learn endotracheal intubation and ventilation, or to practise suturing; dentistry students return in second year to undertake their first steps in dental extractions and intra-oral anaesthetic nerve blocks.

Computer stations in our Anatomy Lab provide paper-free access to teaching materials.

## Plastination



Our teaching is complemented by a collection of plastinated specimens.

## Showcase



Medical Art research into haptic computer models for virtual dissection

## Showcase




Dr Clare Lamb has developed a dissection guide and atlas for Thiel cadavers when she realised that existing material was not suitable.




**Centre for Anatomy &  
Human Identification**

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