

Celebrating 100 Years of NUS Anatomy (Part 1)

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Photos by NUS

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The National University of Singapore (NUS) Department of Anatomy commenced its centennial celebration earlier this year, marking its 100th year of establishment in Singapore.

NUS Anatomy: a history

First founded in 1905 as the Straits and Federated Malay States Government Medical School, the later named King Edward VII College of Medicine established the Department of Anatomy in 1922, chaired by Prof JG Harrower. The department started with an office, lecture theatre and dissection hall at the former female Lunatic Asylum, which was vacated during the Second World War. The anatomy infrastructure at Tan Teck Guan Building was only reopened in 1949, and subsequently introduced a histology and neurophysiology laboratory, founded by Prof A Krishnamurti. New facilities were later opened, such as the Anatomy Museum, animal surgery OT, an animal perfusion room, a tissue culture laboratory and an

animal house to keep animals involved in longer-term research. These facilities were key in training surgeons honing surgical skills and anatomists engaging in research related to animal models.

Throughout the last century, the Department of Anatomy has become an integral part in training all students in healthcare, involving medical, dental, nursing and allied health students, as well as trainees of various surgical specialties engaged in Continual Education Training (CET). Anatomy remains a cardinal pillar to the practice of medicine, relevant in every clinical problem, and forms the foundation of a medical student's career.

Anatomy education

The teaching of undergraduate medical anatomy today is broadly divided into three core topics:

1. The musculoskeletal system (upper and lower limbs);





2. The thorax, abdomen, pelvis and perineum; and
3. The head and neck.

These themes include pre-laboratory didactic lectures, a prosection demonstration and a tutorial. Revisions in the pedagogy saw the introduction of Collaborative Learning Cases and Clinical Application of Medical Sciences, better known to the students as CLCs and CAMS respectively. These provided opportunities for realistic clinical problem-solving with practical application of anatomy and physiology.

Some key events that the department has held in the past include the Singapore Brain Bee Challenge, the International Anatomical Sciences and Cell Biology Conference, and the Asia Pacific International Congress of Anatomists.

Infrastructure in anatomy education

Emeritus Prof Ragunathar Kanagasuntheram worked with Mr Ayubi Berseh (a laboratory technician) to create and curate a series of specially

dissected human specimens framed in plastic cases, purposed as long-term learning resources for medical and dental students. This grew to include normal and abnormal specimens; of note is a unique collection of normal and malformed fetuses, all of them labelled to aid better learning. These specimens can still be found at the NUS Anatomy Museum located at MD 11 Level 2, a familiar haven for students keen on revising structures that were taught during prosection classes.

The traditional approach to learning human anatomy during hands-on cadaveric sessions remains popular among students as a mode of knowledge acquisition. Being able to freely visualise from all possible angles – anterior, posterior, medial, lateral, superior, inferior – to picture and map the structures and organisation of the human body is a great boon. As cadavers gradually diminished in quantity, ten years ago, the Department of Anatomy gained the support of the National Organ Transplantation Unit, Ministry of Health to set up a body donation programme for medical and surgical education. Inspired by the model

of Silent Mentors at the Tzu Chi College of Medicine, which focused on the humane treatment of cadaveric donations for medical education and research, Prof Bay Boon Huat and A/Prof Ng Yee Kong launched a Body Donation and Silent Mentors programme at NUS. Since then, annual appreciation ceremonies have been held to acknowledge the Silent Mentors for their selfless and noble contributions in enabling invaluable acquisition of anatomical knowledge through realistic cadaveric teachings.

And so, the Silent Mentors continue to teach not only students at the undergraduate level, but also those in postgraduate training at CET courses on “Cadaveric Dissection for Residents”. This training plays an important role in the upgrading of surgical finesse and competency in many emerging areas of surgery and helps to supplement training on complex procedures where real-life simulation is not ideal, considering potential risks intra-operatively. Surgical specialties that partner with NUS Anatomy include orthopaedic surgery, hand and reconstructive microsurgery, otolaryngology (ENT),

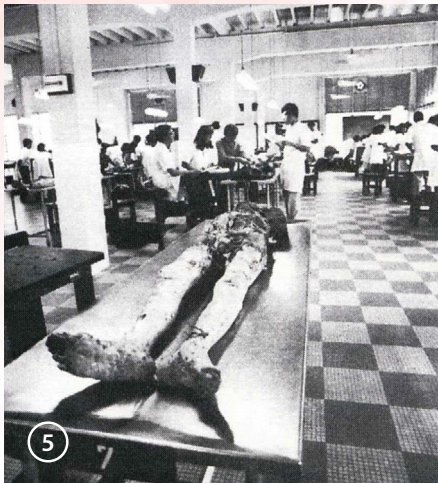
“ The arrival of SARS in 2003 resulted in great difficulty in securing enough cadavers – also known as our Silent Mentors – for dissection during anatomy classes. Emeritus Prof Ling Eng Ang had great foresight in engaging master technicians to develop prosected specimens, which were most valuable in anatomy education, especially since students could not gather in large crowds during dissection sessions. ”

– Prof Bay Boon Huat, former Head of Department of NUS Anatomy



ophthalmology, plastic surgery, O&G, neurosurgery, oral maxillofacial surgery, cardiothoracic surgery and general surgery. Each of these specialties, especially general surgery, conduct one- to two-day workshops in partnership with NUS Anatomy.

In addition to traditional cadaveric education, efforts adapting to the technological advances and changing educational needs have set in motion various initiatives such as the recent digitalisation of the Anatomy Museum – resulting in the Virtual Anatomy Museum which offers virtual tours of cadaveric specimens and histology slides – “Mixed Reality” (Microsoft’s HoloLens) and three-dimensional virtual dissection devices, namely the Anatomage Table.



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Research

Over the past century, the Anatomy Department has made extensive contributions to the advancement of medical and anatomical knowledge through research. The department focuses on two main areas for research: neuroscience and cancer biology.

In the field of neuroscience, Prof Ragunathar Kanagasuntheram and his team had significant findings and publications on the innervation, ultrastructure and functional importance of anatomical structures in humans and primates. Emeritus Prof P Gopalakrishnakone is a pioneer of research on toxins and their effects on skeletal muscles and mammalian organs. Prof Ling EA and

A/Prof S Thameem Dheen both have devoted interest in the field of microglia and have published notable works on international platforms.

The Cancer Biology Research Programme is overseen by Prof Bay BH, A/Prof George Yip Wai Cheong and A/Prof Chen Leilei, in order to support research in carcinogenesis and cancer progression. Prof Bay BH focuses on biomarkers in cancer and molecular-targeted cancer therapeutics while A/Prof Yip WC is interested in the functional significance of heparan and chondroitin sulfate proteoglycans in breast cancer. A/Prof Chen Leilei’s lab delves into the transcriptome instability of human hepatocellular carcinoma.

Notable contributions by the heads of department

Prof JG Harrower (1922–1935) served as the first chairman of the Department of Anatomy. His research focused on the anomalies in the skull of the Hylam Chinese, Hokkien and Tamil populations, and his teaching was well liked by many. The students’ lounge in the Medical College was named Harrower Hall to honour his contributions. Prof WA Fell (1936–1941) and Prof Alan Richmond Ellis (1949–1962) then succeeded his position and led the department through the pre- and post-war years.

Prof Ragunathar Kanagasuntheram (1962–1979) was the first Asian head of department who established the teaching and research facilities for the Anatomy Department. These included an animal house, an animal surgery suite, electron microscope facilities and the Anatomy Museum.

Prof Wong Wai Chow (1979–1992) also served as the head of department, and he is widely recognised for his research in neurodegeneration and neuroregeneration. He was succeeded by Prof Leong Seng Kee (1992–1998), who pioneered research in neuroplasticity and the role of nitric oxide in the nervous system.

Prof Ling EA (1998–2008) is a giant in the field of microglia research, and he is fondly remembered by his students for his unique teaching style using the “chalk



and board” and “projector and screen”. Profs Ling EA and Bay BH (2008–2016) further developed the Anatomy Museum into the modernised, exemplary resource centre it is now today. Together with A/Prof Ng YK, they initiated the Body Donation Programme in 2012 with the foresight to maintain sustainable anatomy teaching using cadavers.

Most recently, A/Prof ST Dheen (2016–present) serves as the current head of department. He initiated the digital transformation of the department and set up CET surgical anatomy workshops for residents. ♦

The Anatomy Centennial Medical Bursary has been established in commemoration of 100 years of anatomy in NUS, in order to alleviate our students’ financial burden while allowing them to focus on their studies and participate meaningfully in the school’s programmes and community activities. A firm foundation year for these medical students is crucial in helping them succeed in their studies, and we would like to ensure that no student is left behind in their pursuit of quality medical education. More information is available at: <https://nus.edu/3fCILq5>.

Legend

1. Tan Teck Guan Building in 1969, the first Anatomy building at Sepoy Lines
2. Prof Kanagasuntheram passing the baton to Prof Wong in 1979
3. Prof Kanagasuntheram and Prof Ling in 1960s/70s
4. Prof Bay Boon Huat, former Head of Department of NUS Anatomy
5. Early Anatomy Hall at Sepoy Lines
6. Anatomy Museum at Kent Ridge before 2003