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Review

History and Scientific Contributions of the Department of Anesthesiology at Ghent University Hospital (UZ Gent), Belgium

De Baerdemaeker L.[1], Herregods L.[1]

[1]*University Hospital Ghent, Belgium, Faculty of Medicine and Health Sciences, Department of Basic and Applied Medical Sciences, University Ghent, Belgium.*

Corresponding author: Luc De Baerdemaeker, University Hospital Ghent, Belgium, Faculty of Medicine and Health Sciences, Department of Basic and Applied Medical Sciences, University Ghent, Corneel Heymanslaan 10, 9000 Gent, Belgium. Email: luc.debaerdemaeker@ugent.be

Introduction

The Department of Anesthesiology at Ghent University Hospital traces its roots back to 1968. That year, the late Prof. Dr. Georges Rolly was appointed as the inaugural head of the department. Having earned his PhD from the Karolinska Institute in Sweden, Prof. Rolly brought deep expertise in respirator research to the institution. He notably documented the versatile Engström ER 311. An advanced anesthesia machine already capable of closed-circuit ventilation during the 1960s. Under his leadership, the department achieved several major clinical milestones. In 1968, Prof. Rolly provided anesthesia for Europe's first lung transplant, collaborating closely with surgeon Prof. Fritz Derom. Later, alongside Prof. Luc Herregods, he pioneered the clinical introduction of intravenous propofol anesthesia in humans. Prof. Rolly also teamed up with Prof. Linda Versichelen to investigate the pharmacokinetics of volatile anesthetics, jet ventilation and high-frequency ventilation. This research optimized safe volatile anesthesia delivery using low fresh gas flows, reducing environmental impacts decades before medical sustainability became a mainstream concern. Prof. Rolly was a visionary educator who elevated training standards across Europe. He integrated the two-year inter-university AVU course into resident training, making anesthesia the first specialty to require formalized knowledge validation. In the 1990s, he co-founded the European Diploma of Anaesthesia and Intensive Care (EDAIC) and held leadership roles within the European Academy of Anaesthesiology, later known as European Society of anaesthesia. Recognizing the immense potential of total intravenous anesthesia (TIVA), Prof. Rolly, along with Prof Versichelen, Prof. Eric Mortier, Prof. Michel Struys and other co-workers, spearheaded rigorous propofol research. This academic drive established the Ghent School of Anaesthesia as a globally recognized center of excellence in modern anesthesia care.

Many of the early pioneers have retired. Prof. dr. emeritus Linda Versichelen her career was focused on making anesthesia safer, more controlled, and more efficient through pharmacological modeling of volatile and intravenous anesthetics. She explored the safety of low flow and closed-circuit anesthesia with a particular contribution to the safety of sevoflurane and the formation of compound A. Prof dr. Emeritus Eric Mortier succeed Prof. dr. Rolly as the second chairman. He was a leading anesthesiology researcher who helped bridge clinical medicine, pharmacology, and engineering. He transitioned from clinician to chairman of the department, chairman of the medical council to dean of the faculty and CEO of the hospital. His research evolved into healthcare policy and ethics. Prof dr. emeritus Jacques Devulder's research focused on chronic pain—especially fibromyalgia—combining clinical medicine with psychological and neurobiological insights to improve how pain is understood and treated. Prof. dr. emeritus Jozef Van Aken's research focused on neuro anesthesia, particularly how intracranial pressure, cerebral blood flow, and cardiovascular responses interact and are influenced by anesthetics and vasoactive medication during brain surgery to improve monitoring and patient safety. Together with Prof Dr Alain Kalmar they revisited the Cushing reflex resulting in new insights. Prof dr. Emeritus Luc Herregods' research evolved from

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clinical anesthesia and pharmacology toward a strong focus on resuscitation science, CPR training, and emergency care systems, with a consistent emphasis on practical, real-world impact.

Dr. Luc Foubert's research was on cardiothoracic anesthesia, pulmonary vascular physiology (notably inhaled nitric oxide), and practical clinical optimization of anesthesia in high-risk patients, with later contributions to patient safety and perioperative systems.

Prof. dr. Patrick Wouters' Ghent-based research focuses on cardiovascular physiology and hemodynamic monitoring in anesthesia—especially in cardiac surgery—combined with perioperative organ protection, methodological rigor, and contributions to ICU metabolic research together with Dr Stefaan Bouchez and Dr Michael Vandenheuvel.

Prof. dr. Emeritus Stefan De Hert's Ghent research focuses on perioperative medicine—especially cardiovascular risk assessment, guideline development, and evidence-based optimization of surgical care—transforming anesthesiology into a comprehensive, patient-centered discipline. His two-year presidency of ESAIC in 2018 was an honor for our department.

Below is a literature-based overview of the main scientific achievements of the Department of Anesthesiology at Ghent University Hospital (UZ Gent) since its foundation in 1968, with key research themes and the names most strongly associated with each contribution.

1. Foundations and early development (1968–1980s): Establishment of modern academic anaesthesiology in Ghent

The formal founding of the department in 1968 marked the transition from service-based anaesthesia to an academic, research-oriented discipline with the establishment of anaesthesiology as an autonomous clinical and academic specialty at the university Hospital Ghent. The initial research focused on integration of physiology, pharmacology, and perioperative care into teaching and research.

2. Cardiovascular and hemodynamic physiology (1990s–present)

Ghent became internationally visible in the study of functional hemodynamic monitoring, especially dynamic preload indicators, arterial waveform analysis, and perioperative cardiovascular risk stratification. Major scientific achievements were on experimental and clinical validation of dynamic parameters (PPV, SVV) under complex conditions (e.g. atrial fibrillation), contributions to perioperative cardiovascular risk assessment in cardiac and non-cardiac surgery and the integration of physiology driven monitoring into perioperative medicine. Important researcher are Patrick Wouters, Stefan De Hert, Luc Foubert, Yvon Derijck, Luc De Baerdemaeker and Piet Wyffels.

3. Perioperative medicine and outcome research (2000s–present)

The department took up its role in international leadership in perioperative outcome studies. The Ghent group played a prominent role in large international multicenter trials, meta-analyses, and guideline shaping work, shifting anaesthesiology toward perioperative medicine. Major scientific achievements involved Contributions to POISE 2, ETPOS, and other large European outcome studies, high impact meta-analyses on volatile anaesthetics, mortality, and organ protection and a strong influence on European perioperative guidelines. Prof Dr Stefan De Hert played a pivotal role in this achievement as research coordinator.

4. Anaesthetic pharmacology & target-controlled infusion (1990s–present)

World leading work in pharmacokinetic/pharmacodynamic modelling. Ghent is internationally recognized for PK/PD modelling, target controlled infusion (TCI), and closed loop systems. Key figures in chronological order are Eric Mortier, Linda Versichelen, Michel Struys, Hugo Vereecke, Marc Coppens, Alain Kalmar, Bjorn Heyse, Martine Neckebroek.

Major scientific achievements involved development and validation of next generation PK models for IV anaesthetics, pioneering work on Bayesian and closed loop TCI systems, translational impact on commercial TCI platforms.

5. Depth of anaesthesia and neuro monitoring using EEG based depth monitoring and brain physiology.

Ghent researchers were among the early European contributors to the scientific validation and critique of EEG derived depth of anaesthesia indices, including BIS and newer monitors.

Major scientific achievements were on the physiological interpretation of EEG changes under anaesthesia, evaluation of closed loop anesthesia using depth of anesthesia monitors Main stakeholders are Michel Struys, Hugo Vereecke.

6. Microcirculation, oxygenation, and organ perfusion

As an example of translational physiology at bedside level, the department produced influential work on vascular reactivity, tissue oxygenation, and vasoactive drugs during anesthesia.

Major scientific achievements were on demonstrated effects of anesthetic and vasoactive agents on organ circulation, advanced intraoperative assessment of organ specific perfusion, linking physiological signals to perioperative outcomes, brain oxygenation monitoring with near infrared spectroscopy (NIRS). Researchers associated to this research domain are Jozef Van Aken, Annelies Moerman, Caroline Van Peteghem, Stefan De Hert, Luc De Baerdemaeker, Jurgen Van Limmen.

7. International leadership, education, and guideline impact

By taking up active roles in international societies, the department helped shaping European and global anaesthesiology guidelines. Presidency and leadership within ESA / ESAIC, EACTA/ EACTAIC, BeSARPP, BAAS/IAAS, ESPCOP just to name a few. Many staff members engaged in editorial roles in Anesthesiology, EJA, Anesthesia & Analgesia, resulting in a major influence on patient safety and perioperative education.

As a closing remark, I would like to recognize our rising generation of specialists and residents, who stand ready to carry forward the torch of innovation and clinical advancement.

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