Christian Seiler, MD, FESC, FACC

Spotlight: Christian Seiler, MD, FESC, FACC

Pioneer of a Noninvasive Method to Measure Coronary Blood Flow and Bio Bypasses as an Alternative to Surgical Bypasses

Christian Seiler, co-chairman of cardiology at the University Hospital, Bern, Switzerland, and president of the Swiss Society of Cardiology, talks to Jennifer Taylor, BSc, MSc, MPhil.

Professor Christian Seiler, MD, FESC, FACC, co-chairman of cardiology, University Hospital, Bern, Switzerland, and president of the Swiss Society of Cardiology (until June 2010) started his working life as a cartographer. Despite enjoying the meticulous nature of cartography, Seiler desired more interaction with people, so he trained in medicine at Bern medical school—chosen because it allowed students contact with patients earlier in their studies than other medical schools in Switzerland. He graduated in 1985, and his subsequent chosen specialty of cardiology, which involves making measurements and physics, enabled him to maintain a link with his former life as a cartographer.

For the past 20 years, Professor Seiler’s primary research interest has been coronary circulation and his research has been mainly funded by the Swiss National Research Foundation and the Swiss Heart Foundation.

Measuring Blood Flow in Heart Muscle in ml/min/g Using Contrast Echocardiography

Professor Seiler’s interest in coronary circulation began when he was a research fellow at the University of Texas in Houston, Tex, between 1990 and 1992. His mentor at that time, coronary physiologist and clinical cardiologist Professor Lance Gould, MD, is according to Professor Seiler, “a cool intelligent guy who is meticulous in his research.” He vividly recalls Professor Gould telling him that probably the most important thing in research is to let the data speak for itself. By just observing the data, another hypothesis might arise, or something unexpected might emerge that falsifies the initial hypothesis. This idea of learning by looking at the data was an important lesson.

Professor Seiler’s main task in Texas was to mathematically model the coronary circulation of the heart. The group showed that human coronary circulation could be modelled mathematically and that the model could be...
Bio Bypasses: an Alternative to Surgical Bypasses

Professor Seiler’s group is now looking at therapeutic aspects and how bio bypasses can be created as an alternative to surgical bypasses. They have been testing ways to improve collateral function and found that they could promote collateral growth using the growth factor granulocyte-macrophage colony-stimulating factor (GM-CSF), a substance that oncologists have used for years to turn on the production of white blood cells. It was the first time a growth factor had been tested in humans to induce collateral growth. A second growth factor, granulocyte colony-stimulating factor (G-CSF), was also effective and patients did not have the flu-like side effects experienced with GM-CSF. The aim is for natural bypasses, called bio bypasses, to become a third pillar in the strategy to treat coronary artery disease, after angioplasty and coronary bypass grafting, but the quest remains to find which method is best.

Professor Seiler’s group has also found a physical way of improving collateral growth—external counter pulsation. Cuffs are put around the legs and pumped up simultaneously to the heart beat, which improves blood flow in coronary circulation. Another method is physical exercise training. Professor Seiler was a subject in this study, in which he performed endurance exercise for several months and had a coronary angiogram at the start and end of the study. His collateral function increased substantially. Professor Seiler has been a subject in his own studies several times. He explains, “You get an impression of how this study affects your patients.”

In collateral circulation research, Professor Seiler’s most important mentor has been Professor Wolfgang Schaper, MD, in Bad Nauheim, Germany, and they meet every couple of months. Professor Schaper has been engaged in the
field of collateral research for the past 45 years and was probably the first person to study the topic in depth. “He is not engaged in clinical cardiology but he’s really a brilliant physiologist and a very honest researcher, which I find very important. You can trust him,” says Professor Seiler.

Advocate of Screening for PFO in Professional Divers

Sports cardiology is another field of interest for Professor Seiler as a result of his own marathon running and because his daughter used to be a diver. She was 1 of his first subjects when he was studying the relevance of patent foramen ovale (PFO) in divers in whom PFO is a risk factor for strokes when they surface from 40m below surface: a lowering in ambient pressure causes small air bubbles to develop in the blood that can cross the border between the right and left atria in patients with PFO.7

Professor Seiler’s group made a similar discovery in mountaineers with PFO, who have an increased risk for high altitude pulmonary oedema.8 It is not clear whether the finding in mountaineers is of relevance, but Professor Seiler advocates screening for PFO in professional divers. Some diver organisations, including the police diving school in central Switzerland, have sent people to him for screening, but the practice is not commonplace.

Another aspect of sports cardiology that interests him is the left ventricular hypertrophy and increased myocardial mass sometimes developed in endurance exercise. This physiological form of hypertrophy can be distinguished from the pathological hypertrophy seen in hypertensive patients using myocardial contrast echocardiography.

References


Contact details for Professor Seiler:
E-mail: Christian.seiler@insel.ch

Jennifer Taylor is a freelance medical journalist.
Born in Lehrte, a small town to the east of Hannover, Germany, in 1967, Professor Ulrich Martin, PhD, head of the Leibniz Research Labs for Biotechnology and Artificial Organs (LEBAO), Hannover, Germany, and professor of cardiorespiratory tissue engineering at Hannover Medical School, had an early introduction to the lab environment thanks to his mother, who worked as a technician. From the age of 3, he was planning his research career, although his aim at that time was focused on protecting big game animals in Africa. At school he was interested in and excelled at science, as well as sports and geography. He was fairly clear that when he left high school at the age of 18 that he would go into a career involving his favourite subjects of chemistry and biology. Thus, after compulsory military service, he entered the Technical University of Hannover to study biology. He then progressed through the veterinary and medical schools and started an early specialisation in molecular biology and lab sciences.

After graduating in 1990, Martin worked on his doctoral thesis, which he presented in 1997 on the cloning of the human C3a receptor and the first characterisation of its expression pattern. His PhD supervisor, microbiologist Andreas Klos, MD, PhD, was an inspiring scientist and teacher. Professor Martin says that Professor Klos’ advice on the importance of being critical in the evaluation of data has proved invaluable. Another influential figure was Gustav Steinhoff, MD, PhD, a professor and director of the Department of Cardiac Thoracic Transplantation and Vascular Surgery at the University of Rostock, Rostock, Germany. Professor Martin says, “He is 1 of the most active scientists among German heart surgeons and recruited me to the Department of Cardiothoracic Surgery.” Professor Steinhoff taught Martin about animal models and their importance for preclinical developments.

Developing the Leibniz Research Labs for Biotechnology and Artificial Organs

A notable mentor whose influence was and continues to be important for Professor Martin is Axel Haverich, MD, PhD, professor and director of the Department of Cardiac, Thoracic, Transplantation, and Vascular Surgery at Hannover Medical School. He says, “Axel has been my great mentor for more than 12 years. He was my main source of inspiration in terms of understanding clinical views and needs, as well as the requirement for interdisciplinary research and human resources management.” Professor Haverich offered Martin 1 of the dual directorships of the Department of Cardiac Thoracic Transplantation and Vascular Surgery and the LEBAO.

The LEBAO, named after Gottfried Wilhelm Leibniz, who spent 40 years of his life in Hannover and was considered the last great polymath to highlight the benefits of interdisciplinary research, was founded by Professor Haverich in 1996 with funding from the Leibniz Prize awarded by the German Research Foundation. It forms the nucleus of the excellence cluster in regenerative medicine (7 institutions in Germany known as REBIRTH, the acronym for Regenerative Biology and Reconstructive Therapies, http://www.rebirth-hannover.de/) and is closely linked to the Department of Cardiac, Thoracic, Transplantation, and Vascular Surgery of the Hannover Medical School. Professor Ulrich says, “The idea was to marry application-oriented basic research with clinical practice under a dual leadership; in this case, Professor Haverich on the clinical side and myself on the research side. This close linkage facilitates better-focused research and development and allows fast translation of innovative therapeutic concepts into clinical practice.”

Spotlight: Ulrich Martin, PhD

“In Vitro Generation of Large Blood Vessels Is the Key Technology for the Generation and Implantation of Larger Dimension Tissue”

Ulrich Martin, head of the Leibniz Research Labs for Biotechnology and Artificial Organs, Hannover, Germany, and professor of cardiorespiratory tissue engineering at Hannover Medical School, talks to Judy Ozkan, BA.
Different aspects of regenerative medicine and organ transplantation are investigated in this way. Current projects at the LEBAO include the development of bioartificial lungs led by Professor Haverich, molecular biotechnology and stem cell research led by Professor Martin, and tissue engineering directed by Andres Hilfiker, PhD. Each research project aims to develop new therapies for the treatment of cardiovascular and respiratory diseases. The overall goal is to support cutting-edge research in Germany and improve international competitiveness. Projects focus the research potential at university locations in Germany and, hence, strengthen their international visibility. There are interconnections and close collaborations with other projects within the Hannover Medical School and REBIRTH, as well as commercial companies.

Professor Martin is most proud of having developed the LEBAO from notes in the “vest pocket of a lab surgeon” to a well-respected research institution in the field of cardiorespiratory and regenerative medicine. He regrets not having had the time to investigate and develop longstanding ideas concerning embryonic stem cell-based tolerance induction, but he plans to develop the basis for clinical translation of their concepts for stem cell-based therapies of cardiorespiratory diseases. His role in REBIRTH has proved most rewarding. He says, “It was quite an achievement, which would not have been possible without the close interaction and excellent collaboration with colleagues Axel Haverich and Chris Baum [MD]. It’s now a real pleasure to realise what has developed here in Hannover from our previous work.” Professor Martin looks forward to reaping the benefits that will flow from the project for many years to come.

Professor Martin sees his own strengths as a researcher as his instincts in the interpretation of experimental results and his persistence concerning the establishment of new fields of research and new techniques. He is focused on the end result and derives great satisfaction from long-term projects that eventually deliver a successful result. One example of this, he suggests, is the development of stem cell-based implantable human myocardium. Of the 67 articles he has had published so far, he says that the most important are those on immunology, xenotransplantation, and stem cell research.1–5

Despite his success in getting a major project such as REBIRTH off the ground, Professor Martin says that certain choices in his academic career have made life more difficult. He explains, “My decision not to follow a typical career path by not joining a well-established research group abroad for a postdoctoral position did not always facilitate my career. Although the choice to stay in Hannover to build a research team led to demanding and fascinating independent work at quite an early stage in my career, the need to apply for funding without sufficient work and publications did result in sleepless nights for many years.” The German Research Foundation and the Federal Ministry of Education and Research have funded most of his work, along with charitable foundations.

“A Cell Source With Almost Unlimited Potential for Proliferation and Differentiation”

Since November 2006, Professor Martin has been deputy coordinator of the REBIRTH excellence cluster, and since March 2008, he has been full professor of cardiorespiratory tissue engineering at the Hannover Medical School and head of the LEBAO. He is also a member of the editorial board of the World Journal of Stem Cells, a visiting professor at the People’s Friendship University, Sochi, Russia, and a member of the Scientific Advisory Board of the German Stem Cell Society.

Research has long been Professor Martin’s driving interest, but he also enjoys direct supervision and mentoring of students. He says, “It is always nice to follow the students’ progress not only within their project but also in the long term regarding their personality and career.” Less enjoyable are the unnecessary administrative hurdles. He comments, “Clearly, administrative rules are necessary; however,
research could be much more effective without this tangled mass of regulations!”

Professor Martin advises would-be researchers: “Don’t miss a chance to look beyond your own nose and discover the fascination of interdisciplinary research. Despite the increasing complexity of the world, it is still necessary to focus on 1 topic of research.” He also suggests that, although it can be helpful to join famous researchers abroad, it is a matter of personal skills, effort, and your stamina as to how successful this will be. “In the end, a certain level of fortune is definitely important to meet the right people at the right time and in the right place.”

Professor Martin’s work is essentially forward looking, and he is broadly optimistic about the future clinical applicability of induced pluripotent stem cell technology, although he is uncertain whether autologous-induced pluripotent stem cell technology will be broadly applied clinically. He says, “The high costs of patient-specific cell preparation and the time required for reprogramming, establishment, and selection of cell clones, cell expansion, differentiation, and potential tissue engineering are not available for acute diseases and injuries.”

Professor Martin believes that tolerance induction or establishment of large worldwide stem cell banks may provide alternatives to autologous therapies. A great advantage of induced pluripotent stem cell technology, he says, “is that it is ethically unproblematic and comes from a cell source with almost unlimited potential for proliferation and differentiation. Nevertheless, there are still major hurdles to be overcome prior to the clinical application of engineered myocardial tissue, including proper integration and functional coupling of cellular transplants. However, proper vascularisation, including in vitro generation of large blood vessels, is the key technology essential for future generation and implantation of larger dimension tissue.”

Professor Martin says his family is most important to him in his life, and his wife and partner of 25 years is his best advisor and counsellor. He enjoys being active and, if time permitted, would spend more time skiing, snowboarding, and windsurfing. He comments that his home life and gardening provide an important balance to his work.

References

Contact details for Professor Martin:
Leibniz Research Labs for Biotechnology and Artificial Organs (LEBAO), Carl-Neuberg-Str. 1, 30625 Hannover, Germany. E-mail: martin.ulrich@mh-hannover.de
Judy Ozkan is a freelance medical journalist.
European Perspectives

Circulation. 2010;121:f73-f78
doi: 10.1161/CIR.0b013e3181d9ce57
Circulation is published by the American Heart Association, 7272 Greenville Avenue, Dallas, TX 75231
Copyright © 2010 American Heart Association, Inc. All rights reserved.
Print ISSN: 0009-7322. Online ISSN: 1524-4539

The online version of this article, along with updated information and services, is located on the World Wide Web at:
http://circ.ahajournals.org/content/121/13/f73.citation

Permissions: Requests for permissions to reproduce figures, tables, or portions of articles originally published in Circulation can be obtained via RightsLink, a service of the Copyright Clearance Center, not the Editorial Office. Once the online version of the published article for which permission is being requested is located, click Request Permissions in the middle column of the Web page under Services. Further information about this process is available in the Permissions and Rights Question and Answer document.

Reprints: Information about reprints can be found online at:
http://www.lww.com/reprints

Subscriptions: Information about subscribing to Circulation is online at:
http://circ.ahajournals.org//subscriptions/