Pioneer in Cardiology: Berndt Lüderitz, MD, PhD, MD (Hon.), EFESC, FACC, FAHA, FHRS

Pioneer of Pacemakers and Implantable Defibrillators and an Expert on the History of Cardiology

Berndt Lüderitz, emeritus professor of medicine and head of the Department of Medicine and Cardiology, University of Bonn, Bonn, Germany, talks to Jennifer Taylor, BSc, MSc, MPhil.

Before he retired, Berndt Lüderitz, MD, PhD, MD (Hon.), EFESC, FACC, FAHA, FHRS, emeritus professor of medicine and head of the Department of Medicine and Cardiology, University of Bonn, Bonn, Germany, worked primarily in the electrophysiology field and was a pioneer of the combined antitachycardia pacemaker, the automatic implantable cardioverter defibrillator, and the atrioventricular defibrillator.

Over the past 20 years, he has become increasingly interested in cardiac history, and has chronicled the contribution of European and other electrophysiologists to the field of cardiac arrhythmias and helped to create electrophysiology as a distinct discipline. Another favourite topic is “the heart in religion, art and medicine,” for which he was awarded the Kurt Polzer Award of the European Academy of Sciences and Art in Austria in 2002.

Professor Lüderitz has published >600 scientific articles and books on basic and clinical electrophysiology and cardiac pacing, intensive care, coronary heart disease, and the history of cardiology. His 1995 book, The History of the Disorders of Cardiac Rhythm, was the first textbook in the field, and is now in its 3rd edition.

Although retired from his university position, Professor Lüderitz still runs a private practice and has numerous commitments, including chair of the Working Groups on Cardiac History of the German Cardiac Society and the Heart Rhythm Society. He is also a member of the History Committee of the European Society of Cardiology and organised an exhibition in Amsterdam, the Netherlands, for the society’s 50th anniversary.

Early Research Showing the Beneficial Effect of Implantated Antitachycardia Pacemakers

Born in Braunschweig, Germany, in 1940, Professor Lüderitz spent his childhood in Prague, Czech Republic. His father was a professor of cardiology at the German University of Prague, and later at the University of Münster, Münster, Germany. Professor Lüderitz’s own interest in cardiology developed in high school. He says, “I was fascinated by the logic of cardiology.”

Professor Lüderitz subsequently studied medicine at the University of Munich, Munich, Germany, and later at Heidelberg, Germany, graduating from Munich in 1965. He explains, “At that time, we had a very, very strict education at home, and my intention was to go as far as possible to start my study. Young people in Germany and elsewhere, France, for example, had little freedom in those days, and university was a chance to spread their wings.”

After graduation, Professor Lüderitz joined the medical department at the University of Munich and specialised in...
In the lab, he conducted microelectrode experiments on animals and studied electrolytes, various aspects of activation development, and excitation of cells, first in the rat diaphragm and later on in the papillary muscles of guinea pigs and other animals. He finally ended up performing studies on humans. His PhD, which he completed at the University of Göttingen, Göttingen, Germany, in 1972, was titled “The Activity of Cardiac Hormones on Excitation.”

At this early stage of Professor Lüderitz’s career, Professor Wolfgang Trautwein, MD, who became a professor in Heidelberg and then in Homburg, Germany, and Professor Josef Dudel, MD, a coworker of Professor Trautwein’s in Heidelberg who then became full professor in Munich, both proved influential. Professor Trautwein was an experimental cardiologist who, among other things, described the electrophysiological properties of the sinus node of the heart and spontaneous action potentials and their regulation by the autonomic nervous system. Professor Trautwein says, “From Trautwein and Dudel, I learned the basic aspects of excitation, the refractory period, and the function of heart muscle cells. That was more or less the theoretical aspect.”

At Munich, Professor Lüderitz worked as a senior lecturer and then an associate professor of medicine until 1982. He investigated how to terminate tachyarrhythmias using electrotherapeutic tools, first in animals and then in humans. In the 1970s, he and his group implanted the first atrioventricular defibrillator in a patient with atrial fibrillation. In 1982, they published their experience showing that cardiac stimulation with implanted antitachycardia pacemakers was an efficient long-term antitachyarrhythmic therapy in selected patients.1

At this time, the latest development in electrotherapy was to defibrillate not only ventricular tachycardia but also atrial tachycardia. Professor Lüderitz worked on an atrioverter,2 but it was not successful as a stand-alone device because patients did not want painful defibrillation for the less hazardous atrial tachycardia.

Responsible for Combining the Antitachycardia Pacemaker and the Automatic Implantable Cardioverter Defibrillator

In 1982, Professor Lüderitz was appointed a full professor of medicine at the University of Bonn, where he headed the Department of Cardiology for 23 years. In Bonn, he established labs for pacing and electrophysiology, a service for cardiac arrhythmias, and a full programme of cardiological research.

Professor Lüderitz’s research group in Bonn combined the antitachycardia pacemaker and the automatic implantable cardioverter defibrillator.3 It was an important step in electrotherapy for ventricular tachyarrhythmias. Today, almost all modern implantable cardioverter defibrillator devices combine the two technologies. Professor Lüderitz says the discovery was “only a logical development of research in cardiac arrhythmias to interrupt and stop tachyarrhythmias by pacing.”

His group also came up with the idea of combining defibrillation of both ventricular and atrial tachycardias in a single device.4 “That makes sense because atrial tachycardia may also influence the ventricular events,” says Professor Lüderitz. “This combined atrioventricular defibrillator is only indicated in patients suffering mainly with ventricular tachyarrhythmias and also interacting atrial arrhythmias. The idea was of course to inhibit both.”

Ablation has been another area of research for Professor Lüderitz and his group.5–7 He comments, “This is a very promising field.” Professor Michel Haïssaguerre, MD, in Bordeaux, France, first showed how to treat and cure supraventricular tachycardia, mainly atrial fibrillation, by ablation of the area where it originates. The procedure has since been refined by Professor Haïssaguerre and other investigators.

When he became a clinical electrophysiologist, Professor Lüderitz learned about pacemakers, ablation, and defibrillation from Professor Sanjeev Sakse, MD, clinical professor of medicine at University of Medicine and Dentistry New Jersey, Robert Wood Johnson Medical School, Newark, NJ, and medical director of the Electrophysiology Research Foundation in Newark. Together, they have published books and they developed the first Interventional Electrophysiology international symposium in 1990. In 1995, they founded the Journal of Interventional Cardiac Electrophysiology, and Professor Sakse is the current editor-in-chief.

Professor Lüderitz has also been influenced by Professor John Camm, MD, British Heart Foundation professor of clinical cardiology, St. George’s University Hospital, London, England. Professor Lüderitz says, “He gave me many ideas, particularly concerning pharmacological efficacy in cardiac arrhythmias.”

Professor Lüderitz’s historical interests take him to Greece, the birthplace of medicine, several times a year. In 2001, he was awarded an honorary doctor of medicine from the University of Athens, Athens, Greece. Photograph courtesy of Professor Lüderitz.
Funding for Professor Lüderitz’s work has come principally from university grants and the German Research Foundation. He has also been supported by a number of societies and companies.

“These Are Among the Happiest Moments: Bringing Together Friends, Colleagues, and Guests on a Special Topic”

Early in his career, Professor Lüderitz began bringing together an active group of young investigators to develop his research ideas. It has been one of the most enjoyable facets of his career, and he enjoys arranging meetings and workshops. He explains, “These are among the happiest moments: bringing together friends, colleagues, and guests on a special topic at an extraordinary place, for instance, in Bonn, Munich, or Newport.”

Professor Lüderitz’s advice for young scientists coming into the field is to follow their own ideas and not feel pressured by others to travel a certain path. Once an area of interest has been chosen, the next step is to look for important mentors who can help with developing those ideas.

Professor Lüderitz is especially satisfied that most of his pupils have gone on to hold important positions, mainly in Germany, but also in Austria and elsewhere. He says, “They will fulfill our ideas and intentions at other institutions so that our ideas do not die out.”

Now writing articles on the history of medicine, mainly dealing with cardiological aspects, Professor Lüderitz has recently published an article on the invention of the stethoscope and an article comparing the work of Wolff, Parkinson, and White, which is described in the electrophysiological correct interpretation of circus movements as the cause of tachycardic rhythm disorders, to the deciphering of hieroglyphic writing by Champollion in 1822 using the Rosetta stone. He argues that Wolff-Parkinson-White syndrome is the Rosetta stone of rhythmology because it explains everything.

In addition to taking holidays in places where he can find something historical, such as papers, buildings, or stamps, Professor Lüderitz is also interested in brewing and is a consultant to the German Institute of Pure Beer and a member of the Pure Beer Society of Namibia. He visits breweries throughout the world, most of which have been founded by Germans. Last year he was invited to the Czech Republic to give a special lecture, “Is Beer Healthy for Your Heart?” He says, “As you can imagine, the answer is a clear yes.”

Professor Lüderitz has been honoured for his work on many occasions. In 2006, he was a visiting professor at Mount Sinai School of Medicine in New York, NY, and his most recent honour for 2011 is a visiting professorship at Beth Israel Hospital in New York.

Selected References


Jennifer Taylor is a freelance medical journalist.
Ten European Stamps Depicting Cardiological Events

“All of Them Reflect Eminent Events, Detections, and Discoveries We Are Still Using in Cardiology”

Berndt Lüderitz, MD, PhD, MD (Hon.), EFESC, FACC, FAHA, FHRS, emeritus professor of medicine and head of the Department of Medicine and Cardiology, University of Bonn, Bonn, Germany, talks to Jennifer Taylor, BSc, MSc, MPhil, about his stamp collection and 10 European stamps depicting cardiological events.

Berndt Lüderitz, MD, PhD, MD (Hon.), EFESC, FACC, FAHA, FHRS, emeritus professor of medicine and head of the Department of Medicine and Cardiology, University of Bonn, Bonn, Germany, has collected stamps for nearly 60 years, following in the footsteps of his parents. It was not only an interesting activity after World War II, when Germany and the city of Berlin were divided into east and west, but Professor Lüderitz was also intrigued by stamps of former German colonies because, in 1883, one of his relatives, Adolf Lüderitz, founded the first German colony, South West Africa, now called Namibia. A city named Lüderitz Bay still exists.

Across the globe, stamps reflect art, culture, religion, and political situations. Professor Lüderitz comments, “In many countries, stamps are used for political propaganda or other messages. It is also a kind of education. You see famous composers and painters from all over the world and also, of course, scientists on stamps.”

About 20 years ago, Professor Lüderitz began incorporating stamps into his articles and lectures. His recent article, “Philatelistische Reise durch die Kardiologie” (“Philatelic Journey through Cardiology”) uses stamps to outline important steps in cardiology. His involvement in the historical committees of the European Society of Cardiology, the German Cardiac Society, and the Heart Rhythm Society in the United States provides him with opportunities to use stamps as a medium to discuss personalities, investigators, and heroes in medicine, in cardiology in particular. First-day-of-issue stamps are especially fruitful for lectures because they contain further information, for example, about the invention of the stethoscope, the first heart transplantation, and the first heart catheter. Professor Lüderitz says, “This fosters the interest of the audience to see how these ideas came to the public via stamps.” He finds that audiences are captivated by the stamps and are more alert for the rest of his lectures than they might be otherwise.

Professor Lüderitz says, “Special inventions, personalities, and events and the interaction of medical issues in this field worldwide are of interest to the general population, not just physicians. Stamps are an important tool for educating patients and the general population.” Various topics have been covered, such as infections, prevention and prophylaxis, and risk factors and how to avoid them. Some countries, such as Austria, actively use stamps in this way.

1. Inventor of Percussion

Austrian physician Leopold Auenbrugger, also called Leopold von Auenbrugge, is shown here in this Austrian stamp. As the son of an innkeeper, he would knock his finger on the wine and spirit barrels and evaluate the echo to determine how full they were. Thus, he invented percussion. Professor Lüderitz comments, “He developed a percussion method of the human thorax, which was apparently so suspicious in its simplicity that its author was removed from his office as hospital physician because it sounded too easy. But later on people became aware of this tremendous invention.” Photograph courtesy of Professor Lüderitz.

2. Inventor of the Stethoscope

This French stamp shows René-Théophile-Hyacinthe Laënnec, inventor of the stethoscope (Greek, stethos, chest; skopos, examination), who came from Brittany, France. He rolled paper together to improve his ability to hear heart sounds. Later, he constructed a wooden tube. “Laënnec redefined the diagnostics of heart valve failures and he discovered the nature of many heart diseases,” says Professor Lüderitz. “Together, percussion, invented by Auenbrugger, and auscultation, invented by Laënnec, are the basis of medical diagnostics.” Photograph courtesy of Professor Lüderitz.
3. Inventor of the Electrocardiogram

Willem Einthoven, who described an improved galvanometer for the first time and was able to register the electrical activity of the heart, is shown in this stamp from the Netherlands. He invented the electrocardiogram in 1902. In 1924, he won a Nobel Prize for being the pioneer of electrocardiography and for developing the string galvanometer. Born on a Dutch colony in Java, Indonesia, Einthoven’s fundamental examinations were performed in Leiden, the Netherlands. Photograph courtesy of Professor Lüderitz.

4. Origin of Pharmacological Therapy for Heart Diseases

This German stamp shows the digitalis plant (also called fox-glove), from which glycosides are derived. At the end of the 18th century, William Withering introduced glycosides into his practice. He was a general physician in Birmingham, England, where his brother was director of the botanical garden, and he was the first to detect the effect of glycosides taken from the digitalis flower in heart diseases. Professor Lüderitz says, “For centuries, digitalis was the most important remedy for the heart. It became the basis of drug therapy. Withering is the founder of pharmacological therapy of heart diseases.” Withering published an account of the foxglove and some of its medical uses, with practical remarks on dropsy and other diseases. In it he reports 10 years of observations and experiences with digitalis in patients with dropsy. Photograph courtesy of Professor Lüderitz.

5. Discoverers of Quinine

Pierre Joseph Pelletier and Joseph-Bienaimé Caventou, who isolated quinine in 1820, are shown in this French stamp. The chemical structure of quinine is also depicted. Quinine comes from the china bark (also called Jesuit bark) of the cinchona tree, which was named after the Countess of Chinchon. In the mid-17th century the bark was imported from Peru to Europe by Jesuits to treat malaria, particularly for sailors travelling to East India. In 1918, the drug was described as an effective remedy for atrial fibrillation by the Swiss physician Frey. “It was seen that quinine and particularly quinidine, an optical isomer of quinine, eliminated atrial fibrillation,” says Professor Lüderitz. Photograph courtesy of Professor Lüderitz.

6. Discoverer of Purkinje Fibres

This stamp from former Czechoslovakia honours Jan Evangelista Purkyně, who was born in Bohemia, today the Czech Republic. As a professor of physiology, he was one of the first to use a microscope, and he made his main contribution to science in 1839, when he described the Purkinje fibres. Photograph courtesy of Professor Lüderitz.
7. Inventor of the Cardiac Catheter

Werner Forssmann, the inventor of the heart catheter, is depicted at the top left of this German stamp. The top right shows the chest and heart with the catheter inside. It also shows a coronary arteriograph, which was not done by Forssmann, although he performed the first controlled catheterisation of the right atrium in a human in 1929. As a 25-year-old recent graduate, he introduced a urethral catheter into his own venous system, advanced it up to his right atrium, and then took chest radiographs to document the procedure. Professor Lüderitz says, “He took some alcohol to be courageous enough. Forssmann’s goal was to inject drugs into the heart to improve their efficacy, but later it became a superb diagnostic tool to evaluate heart diseases.” Forssmann won the Nobel Prize in Physiology or Medicine in 1956, which he shared with André F. Cournand and Dickinson W. Richards. Photograph courtesy of Professor Lüderitz.

8. Discoverer of the Doppler Effect

Christian Doppler, an Austrian physicist who founded the Doppler effect at the end of the 19th century, is depicted in this Austrian stamp. The 2 circles in the bottom right corner show the source and wave of sound interacting with each other depending on the motion. The stamp was made to celebrate the 150th anniversary of his discovery, thus the headline “150 Jahre Doppler-Prinzip” (“150 Years Doppler Principle”). Doppler was a professor of mathematics and physics in Prague, Czech Republic, later becoming director of the Polytechnic Institute in Vienna, Austria. He originally tested his hypothesis using an orchestra, which played in a railway station while a train passed. It enabled him to evaluate the interaction between the source of the sound and the motion back and forth. The same principle is used today in ultrasound diagnostics. Professor Lüderitz says, “His invention of the Doppler effect revolutionised cardiology.” Photograph courtesy of Professor Lüderitz.

9. Discoverer of the Blood Circulation

William Harvey, who discovered the blood circulation, was born in Kent, England, in 1578 and died in 1657. He is depicted in this Hungarian stamp, together with the heart circulation system. Professor Lüderitz says, “Nobody knew before how it worked. Harvey’s phenomenal, fantastic discovery was that we have 2 circulating systems—the blood takes up oxygen in the lungs, and then this oxygen-saturated blood goes back to the heart and is pumped through the arteries in the system supplying the heart, brain, kidneys, and so on.” Photograph courtesy of Professor Lüderitz.

10. Inventor of the X-ray

This stamp from the former German Democratic Republic shows Wilhelm Conrad Röntgen, inventor of the X-ray, who was born in 1845. Röntgen was a physicist and professor in a number of cities, holding his final post in Munich, Germany. He discovered the electromagnetic effect of polarisation, the so-called Röntgen current, and in 1895, he incidentally discovered a new type of ray, later named Röntgen rays in German-speaking areas and X-rays worldwide. In 1901, Röntgen received the Nobel Prize in Physics because, says Professor Lüderitz, “this was almost a revolution in the diagnostics of heart and circulation diseases.” Photograph courtesy of Professor Lüderitz.

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European Perspectives

Circulation. 2011;123:f49-f54
doi: 10.1161/CIR.0b013e3182044e29

Circulation is published by the American Heart Association, 7272 Greenville Avenue, Dallas, TX 75231
Copyright © 2011 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/123/9/f49.citation

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