

History of cardiovascular research at the Charles University

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1348-1918 (Czech Kingdom and Austro-Hungarian Monarchy)

Charles University (*Figures 1 and 2*) was founded by Charles IVth in 1348 as the first university North from the Alps and East from France. Thus, it is the oldest university in the Central, North, and East Europe. It is also sometimes considered to be the oldest German University, because Charles IVth in those years was Emperor of the Holy Roman Empire, which included also current Germany. In fact, during the first 60 years (1348-1408) Charles University was a truly international school with German, Czech, Polish, Hungarian, and other students and teachers. When universities in Krakow (1364), Heidelberg (1386), and Leipzig (1409) were founded, many professors from Prague moved to these new universities. The Faculty of Medicine in Prague was founded in the same year as the Charles University (1348).

The beginnings of medical research at Charles University may be marked by the first autopsy open to the public on the territory of the Lands of the Bohemian Crown, carried out on 8-12 June 1600 in Prague on the corpse of a hanged criminal and published in 1601¹ by Jan Jesenský alias Johannes Jessenius (1556-1621), the later rector of the University and a leader of the Czech Revolt against the rule of the Habsburg dynasty in 1618-20, who was then sentenced to death and beheaded.

A graduate from Charles-Ferdinand University (its modified name during 1654-1920 period after the Austrian emperor Ferdinand IIIrd) Jan Evangelista Purkyně (*Figure 3*), also written as Purkinje, (1787-1869) worked as a prosector and assistant of anatomy and physiology and discovered the Purkinje law of vertigo (1820) here. Later, he worked as full professor of physiology at the University of Wrocław and discovered several entoptic phenomena named after him such as Purkinje images, P. tree, P. effect, P.

afterimages (1823), nine principal configuration groups of fingerprints (1823), P. germinal vesicle (1825), sweat glands (1833), cerebellar P. cells (1837) and, after all, the network of specific myocardial Purkinje fibres (1839),² thereby provoking further research to culminate by S. Tawara's work on the heart conduction system (1905, 1906). He then developed (1837) an outline of the cell theory topped off later by M. Schleiden (1838) and T. Schwann (1839). He finally founded the world's 1st institute of physiology in Wrocław (1839) and, after his comeback to the Charles University, another such institute in Prague (1851).

Karl Rokitansky (1804-78) studied philosophy and medicine in Prague and Vienna and worked at the dissecting room of Vienna General Hospital since 1830. He put foundations of the descriptive special pathological anatomy as well as general pathology and, together with his compatriot, the internist Josef Škoda (1805-81) who topped off the development of the physical examination by the epoch-making treatise on percussion and auscultation (1839), he created the so-called 'Second Vienna Medical School' that set the progressive course of development for the world medicine and inspired the development of its parallel 'Prague Medical School'. Besides the genial textbooks of pathology he contributed to the literature of cardiology by the work on defects of the heart sheath.³

Samuel Siegfried Karl von Basch (1837-1905), a student of medicine in Prague and Vienna, invented the sphygmomanometer for bloodless measuring of blood pressure (1880) and introduced its clinical use.⁴ He determined blood pressure in the left atrium and studied cardiac dyspnoea.

Emerich Maixner (1847-1920), an excellent diagnostician and scientist, a pioneer of the new conception of internal medicine based on physiology. He published the 1st modern monography in Czech on diseases of the heart and vessels (1888, 1912) where he emphasized the importance of experiment and physiology for clinicians.⁵ He described sudden deaths of patients who had suffered from angina

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pectoris with thrombotic closures of coronary arteries; thus, he became familiar with the course of myocardial infarction, even though he did not found it to be a clinical unit.

Jan Janský (1873-1921), a Prague psychiatrist, vainly attempted to find any distinction between sera of psychotics and normal persons in agglutination or haemolytic properties. As a side finding, however, he confirmed the discovery of three blood groups by K. Landsteiner and named them I, II, and III (the today's names are A, B, O). Moreover, he himself discovered a fourth group which he named IV (the today's AB) and he himself was aware of great importance of the discovery but his work was written solely in a Czech periodical⁶ remained aside attention for



Figure 1 Carolinum - Charles University historical buildings in the center of Prague.

years and the discoverer, later a professor and head of the ward of forensic psychiatry at Prague Military Hospital, devoted himself to the field of his profession until he died in consequence of myocardial infarction.

1918-1992 (Czechoslovakia)

The Czechoslovak Society of Cardiology was founded in Prague in 1929 as the world's third cardiology society (American Heart Association was founded in 1924 and German Cardiac Society in 1927) thanks for the effort of Václav Libenský (1877-1938). He was head of the cardiology and roentgenology department of the Charles University Policlinic (1920), the head and a builder (1924) of the carbonic mineral spa in the Central Bohemian town Poděbrady with its specialization in the treatment of cardiovascular diseases,⁷ a full professor of cardiology (1927) at Charles University and the 1st president of the Society. Libenský and the Czechoslovak Society of Cardiology organized the world first cardiology congress in Prague in 1933!

Bohumil Prusík (1886-1964), a cardiologist and founder of Czech angiology,⁸ the head of the Clinic of Propedeutics (1930-40), the internal ward of the Královské Vinohrady Hospital (1940-45), and the IVth Internal Clinic (1945-58) with the laboratory of angiology (1952-63), respectively, bought the first electrocardiograph for the IInd medical clinic (1912), discovered the direct influence of adrenalin on myocardium in the total atrioventricular blocade



Figure 2 Charles University Aula Magna with statue of the Czech and Roman Emperor Charles the IVth



Figure 3 Statue of Purkinje in Prague (Charles Square).

(1924), discovered the influence of nicotin acid in vessel diseases and founded dietetics as a discipline.

Klement Weber (1890-1971) graduated from the Charles University and later founded the Institute for Blood Circulation Diseases and became its first director (1951-61). As the world's first he pointed out myocardial irritability disorders as a consequence of kalium depletion.⁹

Otto Klein (1891-1968) in 1915 graduated from German part of the Prague University, then he served as a military physician at the East front of the World War I and thereafter as a head of a military hospital at the Italian front. After war he returned to Prague and was working at the department of internal medicine lead by professor Nonenbruch. In 1929, he carried out the world 1st diagnostic cardiac catheterization of the human right heart (in real patients—unlike Werner Forssmann, who did it few months earlier on himself). Klein successfully estimated the cardiac output and gained the mixed venous blood.^{10,11} W. Forssmann later obtained the Nobel Prize, because the Nobel committee was not aware about Otto Klein work. Klein as a Jew must resignate and flee in 1939, he left Prague for Buenos Aires to continue in his research until 1951. In 1964 (Figure 4), he visited Prague again for the European Congress of Cardiology and he met there Professor Jiri Widimsky.

Stanislav Mentl (1894-1981), Libenský's assistant at the cardiology and roentgenology department of the University Polyclinic (1920), a co-founder and member of the 1st committee of the Czechoslovak Society of Cardiology (1929) and a co-founder of the Czechoslovak Society of Biotypology (1937), professor since 1933, built a network

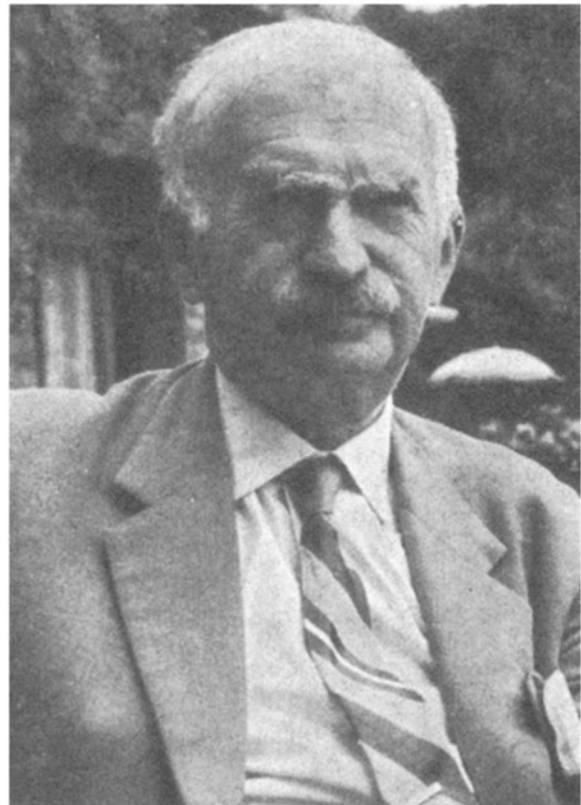


Figure 4 Otto Klein.

of advisory centres of cardiology at 50 hospitals in Czechoslovakia, then acted as the head of the department of cardiology in the Královské Vinohrady Hospital in Prague (1935-45). From 22 September till 4 October 1938, he was Minister of Public Health in the last government of the 1st Czechoslovak Republic. In the years 1942-45, he acted as president of the Czech Society of Cardiology.

Josef Brumlík (1897-1979), a secretary of the Czechoslovak Society of Cardiology with the field of interest in the pulmonary circulation, as a Jew saved his life by flight on 15 April 1939 to settle down in Mexico where, collaborating with the cardiologist Ignacio Chávez,¹² he took part in the founding, in 1944, of the world's first self-governing cardiological institute. Thereafter since 1944 in New York, he served as a representative of Czechoslovakia in the permanent committee of the UNRRA, pursued research on electrocardiography.

Antonín Vančura (1899-1956) worked since 1924 at Prague General Hospital as assistant at the IInd Medical Clinic (1926-39), as senior doctor at the IInd internal department (1939-45), as deputy head (1945) and, as full professor (1946), appointed head of the IInd Internal Clinic (1947-56). The co-founder of Czechoslovak nephrology and excellent immunologist focused on hypertension, too;¹³ moreover, he worked out the internationally regarded classification of hypertonic diseases.

František Herles (1900-91) worked at the IInd Medical Clinic since 1924 until 1976, focusing on the pulmonary circulation and electrocardiography. In 1929, as the 1st in Czechoslovakia he found the electrocardiographic picture

of the acute myocardial infarction. He later wrote the 1st textbook of electrocardiography in Czech. He led a catheterization laboratory at the IInd medical clinic for investigate the electric field of the heart and the cardiopulmonary circulation; the so-called 'Czechoslovak school of cor pulmonale' was born here.¹⁴

Pavel Lukl (1905-95) worked at internal clinics in Prague, Hradec Králové, and Olomouc, resp. After having returned from a visit of the USA, he carried out the first modern cardiac catheterization in Czechoslovakia (1948). As president of the Czechoslovak, later Czech Society of Cardiology (1959-71) he organized the IVth European Congress of Cardiology in Prague in 1964, was elected the vice president of the European Society of Cardiology and in 1968 its president. After the occupation of Czechoslovakia by the Soviet Army on 21 August 1968, he was persecuted and, in 1970, forced to retire for political reasons. Despite of tireless scientific work,¹⁵ he could not return to the University of Olomouc until 1990 after restoration of democracy in Czechoslovakia.

Jan Brod (1912-85), graduated from Charles University (1937), left as a Jew for France (1938) to join voluntarily the Czechoslovak Foreign Army there (1939) for to serve in Great Britain, Algeria, and Italy. Since 1945 at the 1st internal clinic, he introduced the right-sided heart catheterization and examination of renal blood plasma flow rate using infusion of para-aminohippuric acid (1946). Since 1951, he worked at the Institute for Blood Circulation Diseases as the director of the Institute (1961-68) till he left for Hannover in West Germany to direct a department of nephrology. His field of activity included heart failure,¹⁶ hypertension as well as renal diseases.

Vilém (later in US William) Ganz (1919-2009) studied medicine in Prague since 1938 until the Nazi closure of Czech universities (1939). As a Slovak Jew, he was put in a Nazi labour camp in Hungary from where he escaped just before the transport to Auschwitz to survive in Budapest. He graduated (1947) and worked in Prague at the internal department of the Na Bulovce Hospital and, from 1951, at the Institute for Blood Circulation Diseases; here, in 1959, using a catheter with a thermistor on the tip inserted into the coronary sinus, Ganz and A. Froněk were able to measure the blood flow rate through the myocardium of the left ventricle in dogs after administration of nitroglycerine. In 1966 Ganz fled Czechoslovakia. In Los Angeles, he worked with Jeremy Swan to develop the Swan-Ganz catheter.¹⁷ In the early 1980s, he focused his research on thrombolysis.

Bohumil Peleška (1921-98), a surgeon and researcher at the experimental department of the Institute of experimental and clinical surgery in Prague, constructed a portable battery-powered defibrillator (1957); he invented the optimal shape of defibrillation impulse (early 60s) which provided maximal efficacy of defibrillation along with minimal damage of myocardium;¹⁸ he focused on long-term cardiostimulation which resulted in construction of the first Czechoslovak implantable cardiostimulator.

The graduated paediatrician Milan Šamánek (born 1931) who had previously been trained at the Institute for Blood Circulation Diseases in Prague (1961-62) and for two following years in Philadelphia with D.M. Aviado was no longer allowed to cross the iron curtain westward after the Soviet

Army occupied Czechoslovakia. Then, he founded a unique paediatric centre in Prague-Motol (1977) specialized in early correction of heart defects in newborns and sucklings. He has built a care system that saves thousands of Czechoslovak children with congenital heart defects.¹⁹

This shortlist of the foremost leaders of the Czech cardiology is reaching the last name: Jiří Widimský (born 1925) began his career as a researcher at the Institute for Blood Circulation Diseases—later the Clinic of Cardiology—of the Institute for Clinical and Experimental Medicine in Prague (1951-69); he thereafter worked as the head of the IInd internal research base of the Institute for Clinical and Experimental Medicine (1971-83) and then as the head of the Department of Cardiology of the Institute for Postgraduate Medical Education (1983-93). He was elected the president of European Society for Pathophysiology of Breathing (1974-76), and the vice president of the European Society of Cardiology (1980-84). Systemic hypertension and pulmonary hypertension prevails among his subject matters.²⁰ He counts for a legend equipped with encyclopaedic knowledge extending far beyond the limits of the proper field of cardiology. He was able to speak fluently eight languages.

After 1993 (Czech Republic)

The historical view on the current era of Czech cardiology should be left to future analyses. We simply summarize here the list of presidents of the Czech Society of Cardiology during this period: Vladimír Staněk (1990-95), Roman Čerbák (1995-2000), Jaromír Hradec (2000-5), Michael Aschermann (2005-8), Václav Chaloupka (2008-11), Petr Widimský (2011-15), Miloš Táborský (2015-19), and Aleš Linhart (2019-). *Six out of these eight presidents were either graduates or employees (or both) of the Charles University.*

We also summarize the list of Czech cardiologists, who were elected to the Board of the European Society of Cardiology: Pavel Lukl (1964-72), Jiří Widimský (1976-84), Jaromír Hradec (1998-2000), Petr Widimský (2004-8), Josef Kautzner (2012-14), and Zuzana Mořovská (2018-20). *Five of these six were graduates and/or employees of the Charles University.*

This simple overview provides clear insight on the importance of the current role of the Charles University in modern Czech cardiology.

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