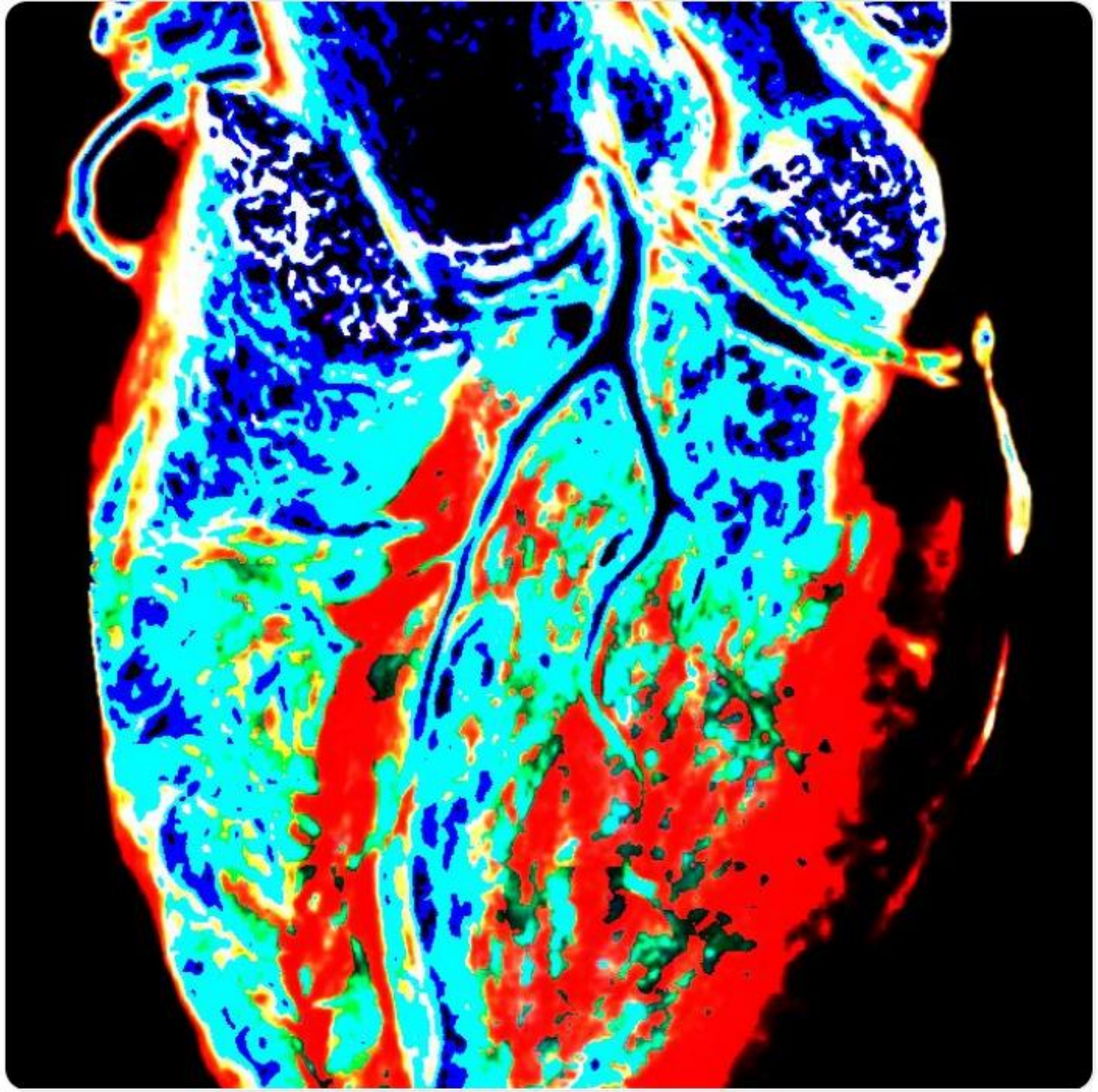

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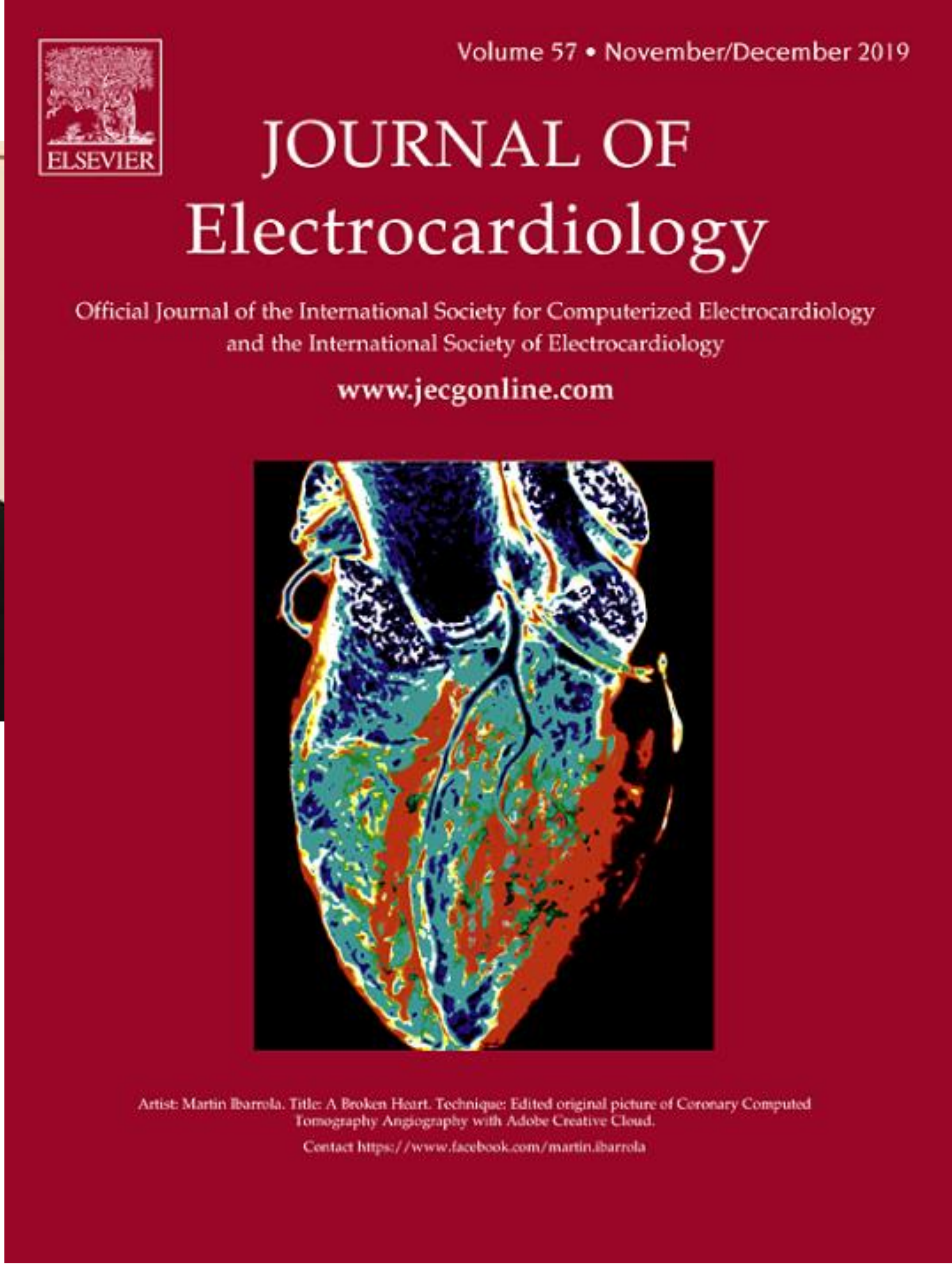
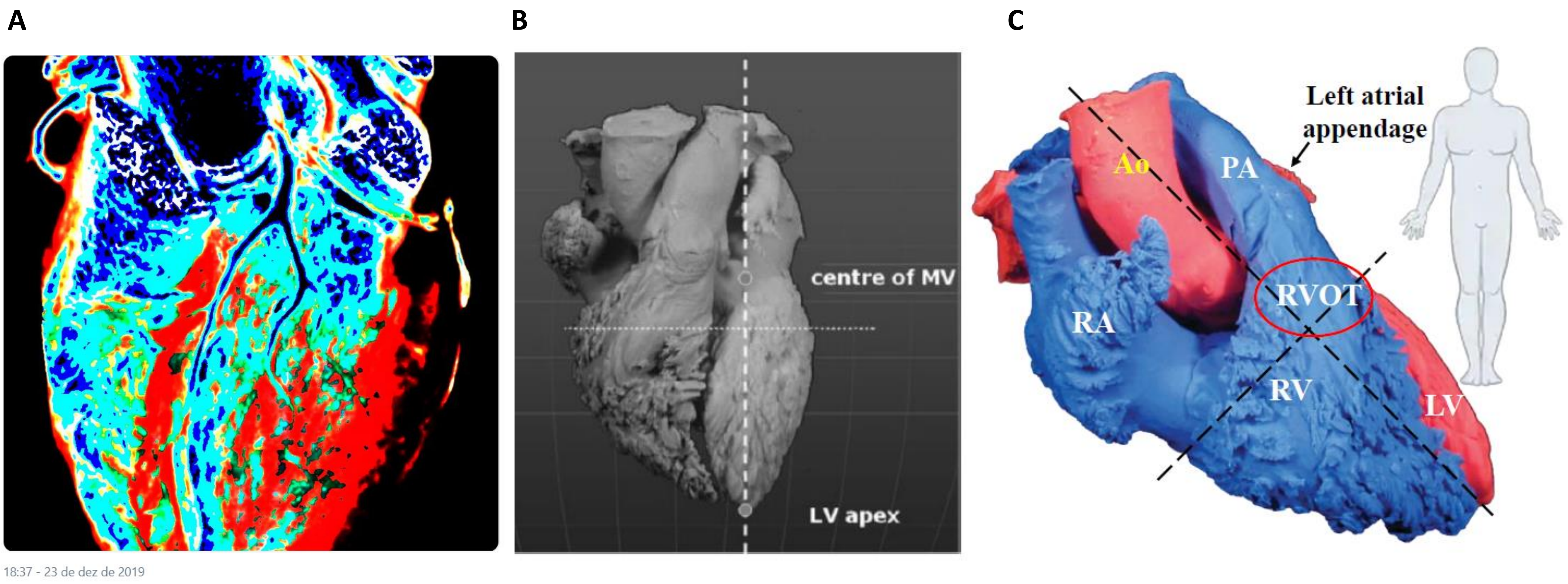
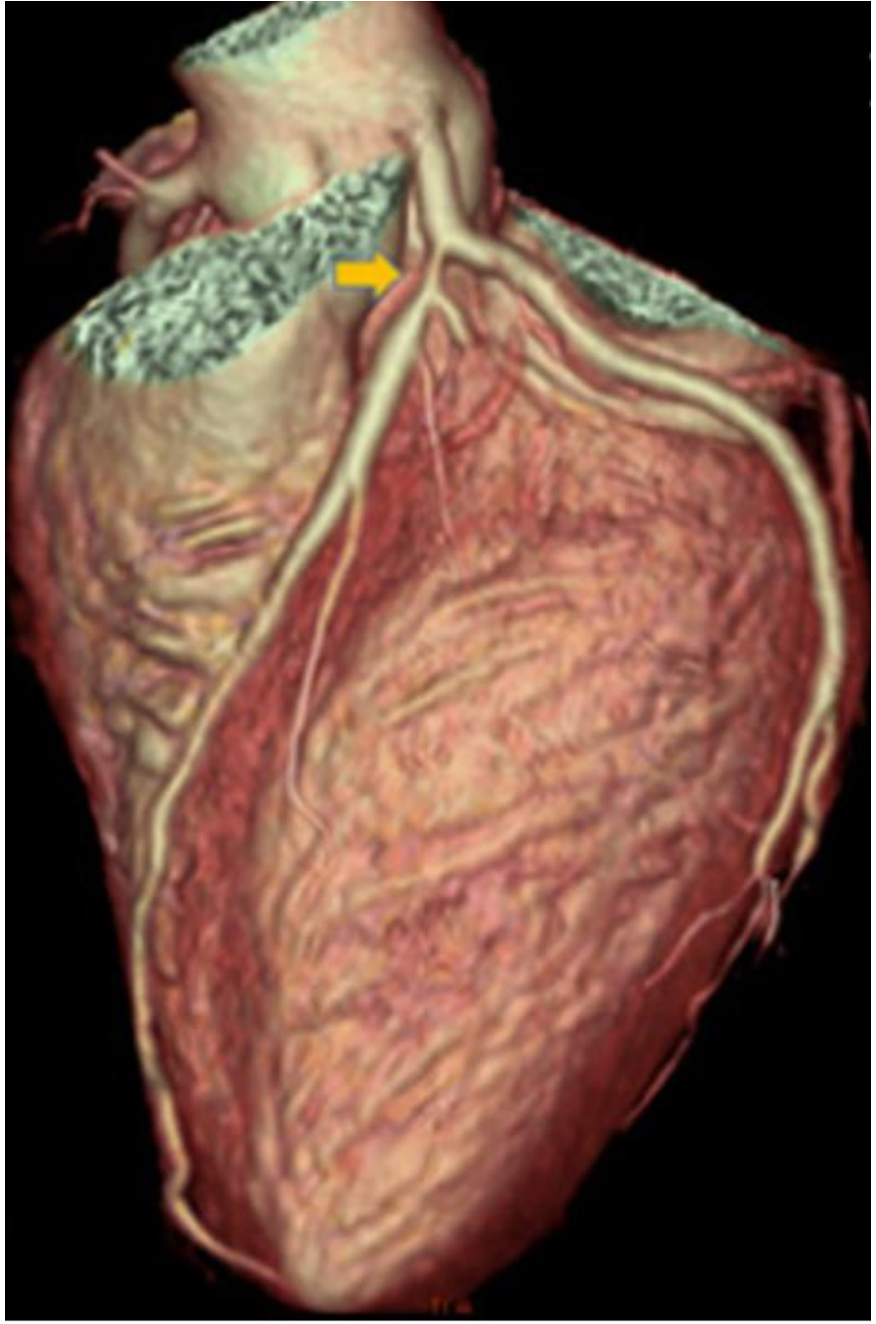
#OnTheCover: This volume features an illustration by Dr. Martin Ibarrola (@elciudadanobv) titled “A Broken Heart.” This is an edited original picture of Coronary Computed Tomography Angiography. Thank you for your contribution Dr. @elciudadanobv! #JECG

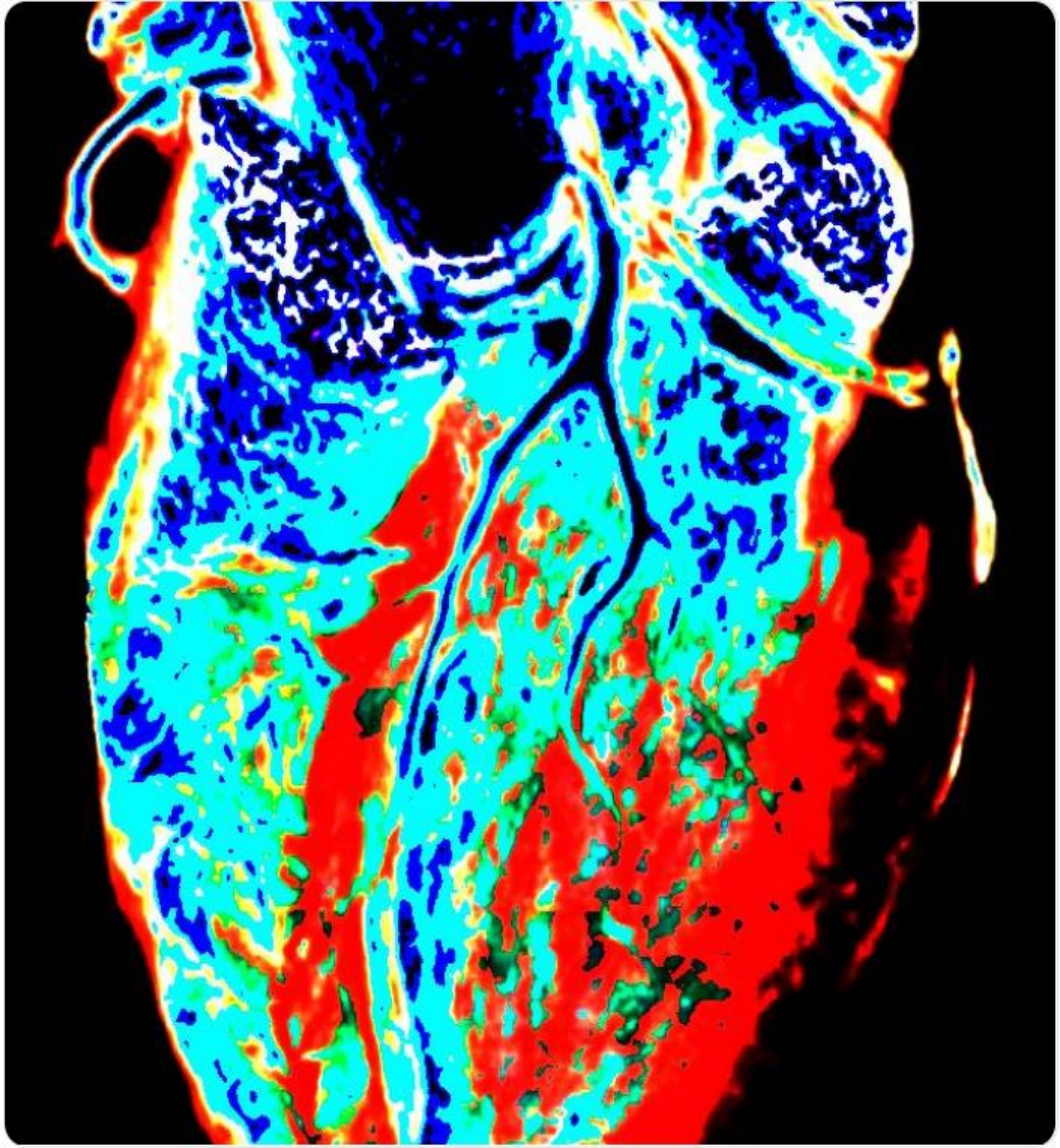




Panels A and B shows the heart in its “Valentine” position with the long axis of the left ventricle antof the left ventricle; C shows the truly position of the heart In C we have positioned the heart in attitudinally appropriate fashion, showing the angulation of the ventricular axes relative to the axes of the body. Due to the asymmetry of the heart, it has long been described in what is known as the 'Valentine' position, in which the heart is oriented vertically downwards. It defines the heart as a solitary organ and provides no reference point for its location within the chest



Tridimensional reconstruction showing impairment in LDA



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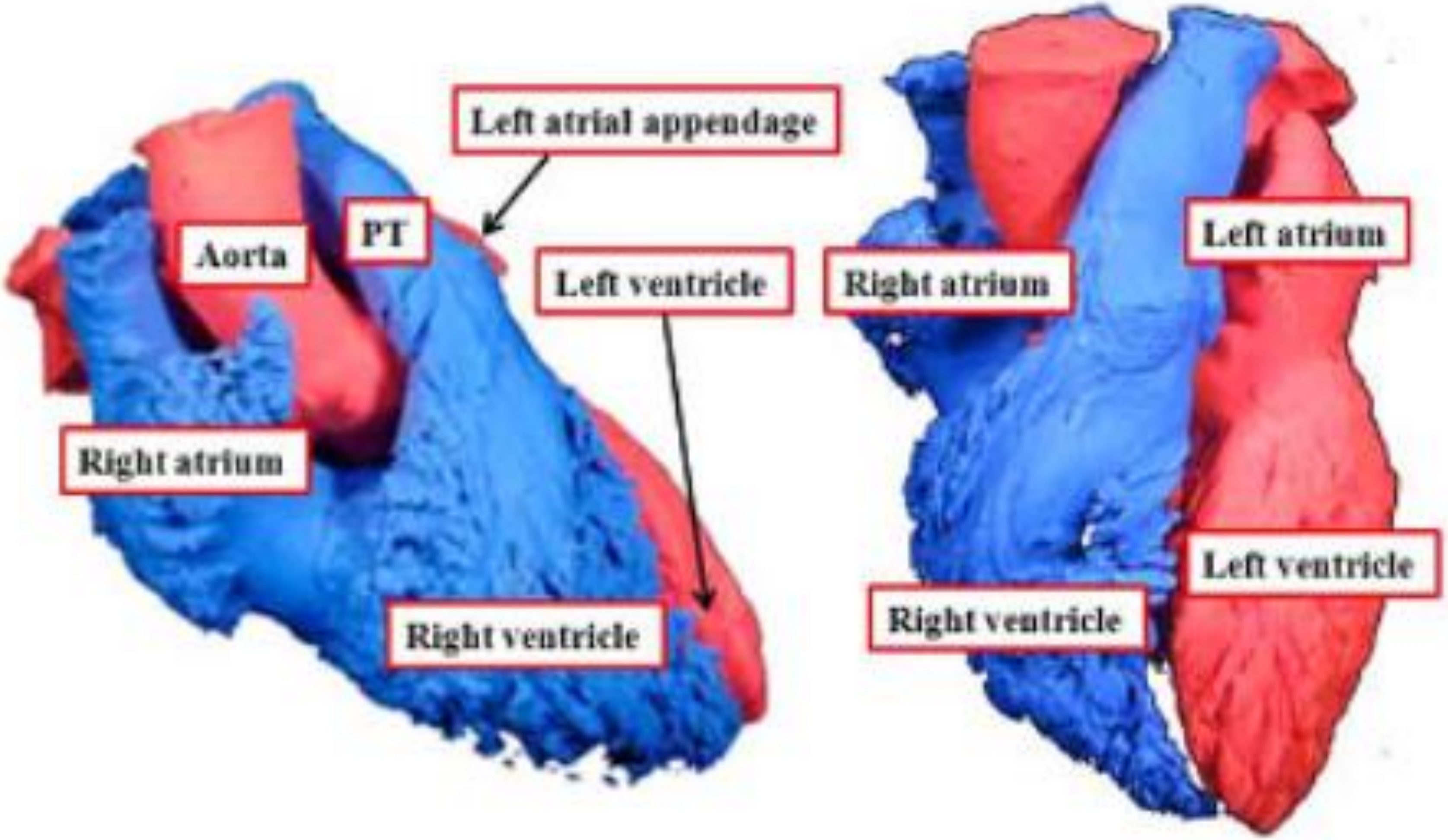
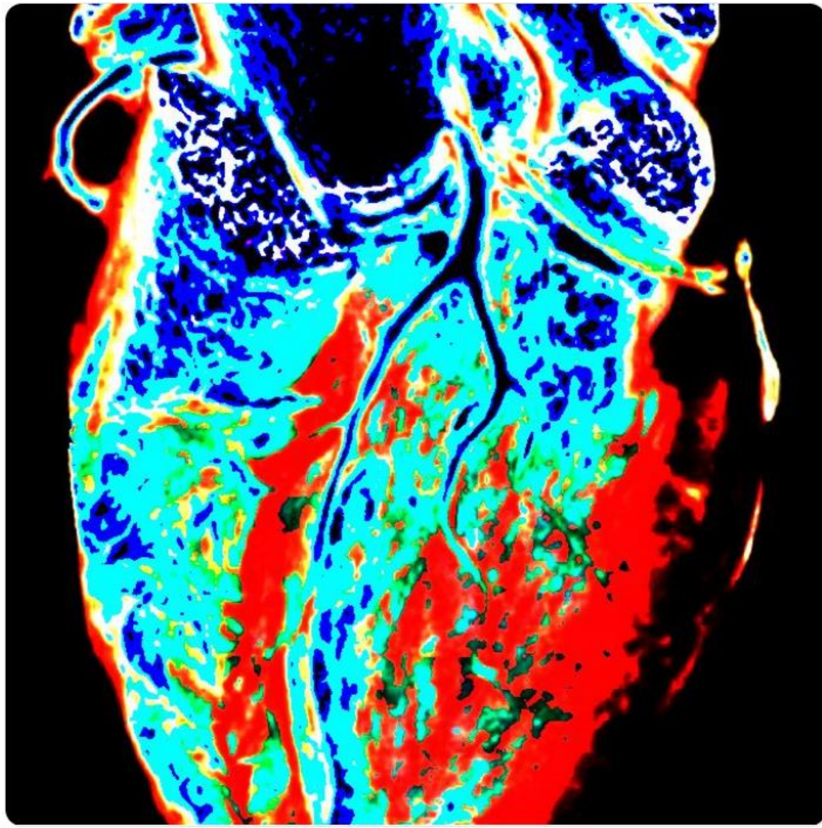
Blood volumes: Attitudinally Correct Versus Valentine





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The left-hand panel shows casts of the cardiac cavities positioned as the heart usually lies within the thorax. The so-called right chambers have been cast in blue and the alleged left chambers in red. As can be seen, in reality, the right atrium and ventricle are largely positioned in front of their left sided counterparts. All that is seen of the left atrium is the tip of the appendage. So as to see all four cardiac chambers, it is necessary to rotate the casts in both the right to left and posterior to anterior planes.

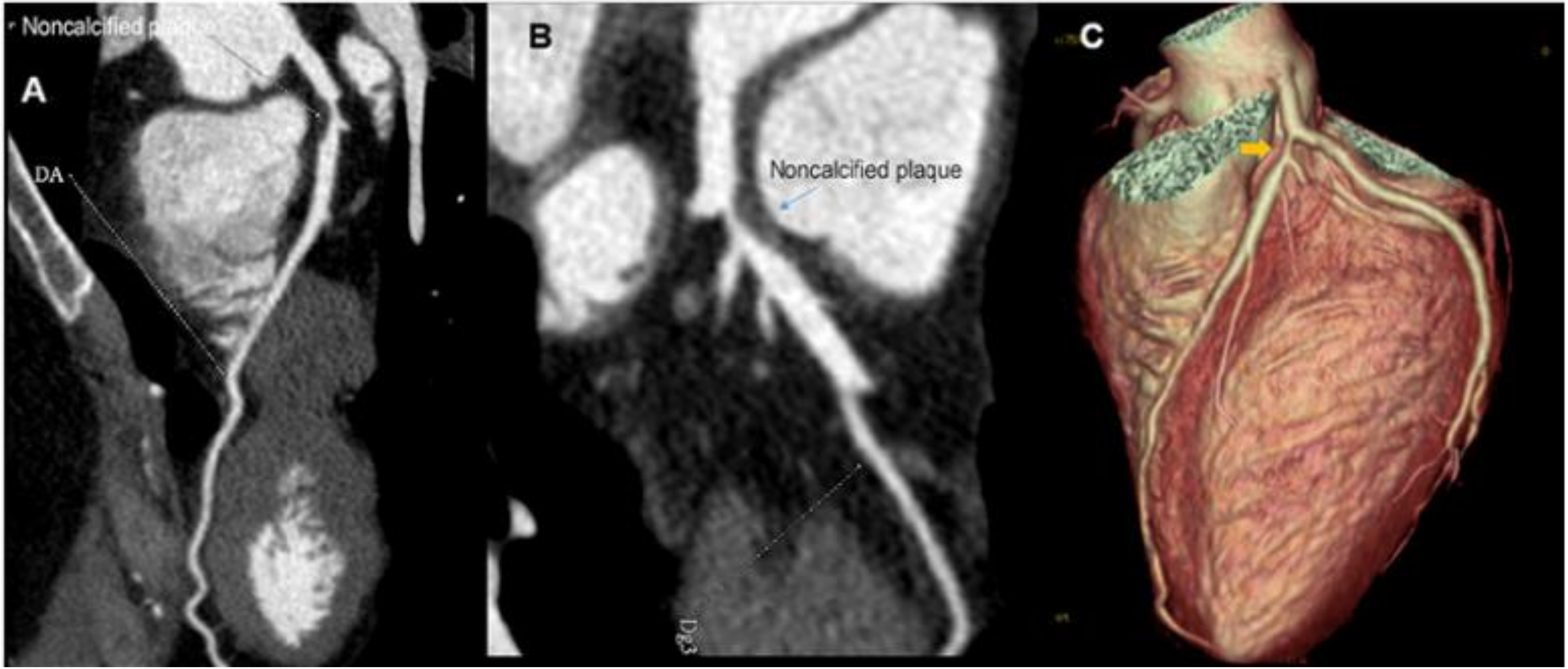


Figure 1 – Noncalcified plaque with zero calcium score. Thirty-eight-year old woman; A and B) multiplanar reconstructions showing considerable lumen reduction in left anterior descending artery (LDA); C) Tridimensional reconstruction showing impairment in DA (yellow arrow). The heart in incorrect “Valentine” position

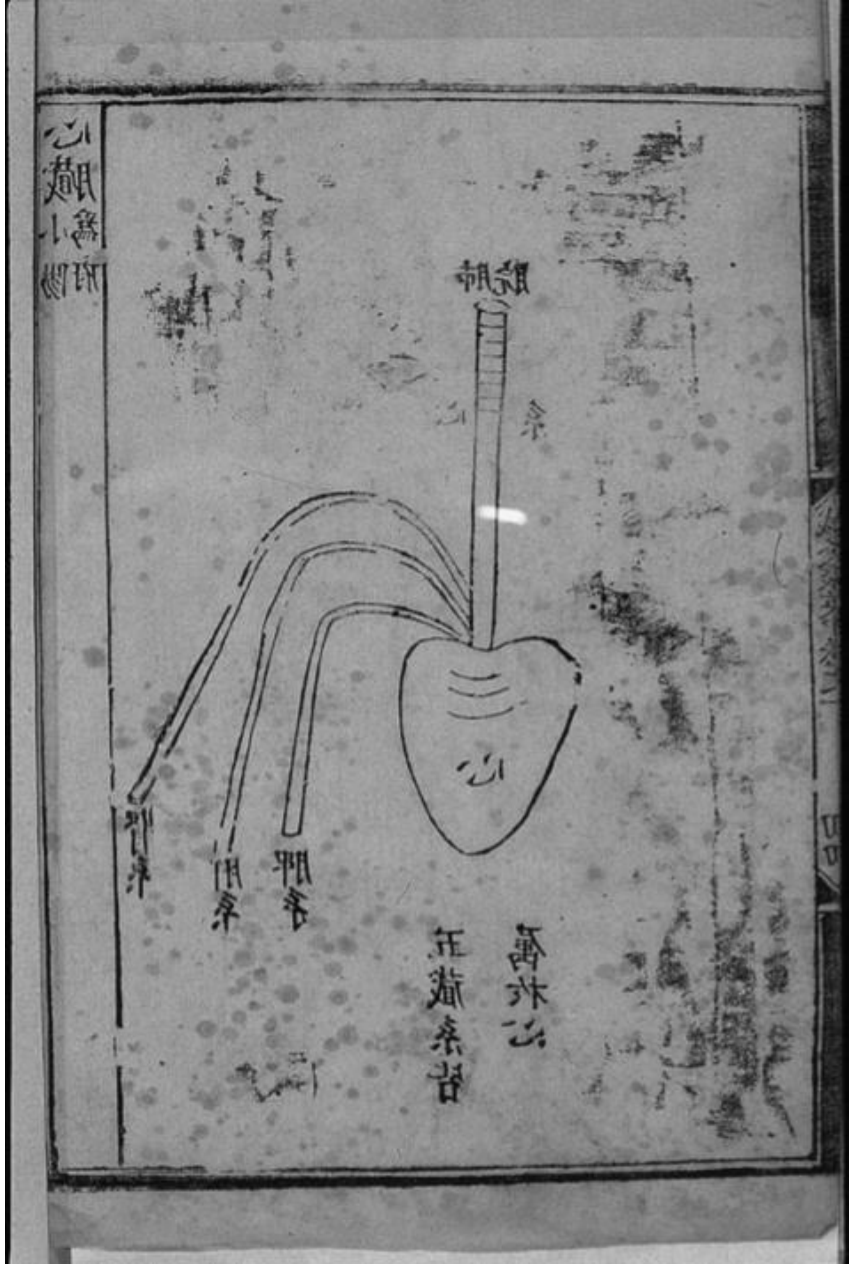
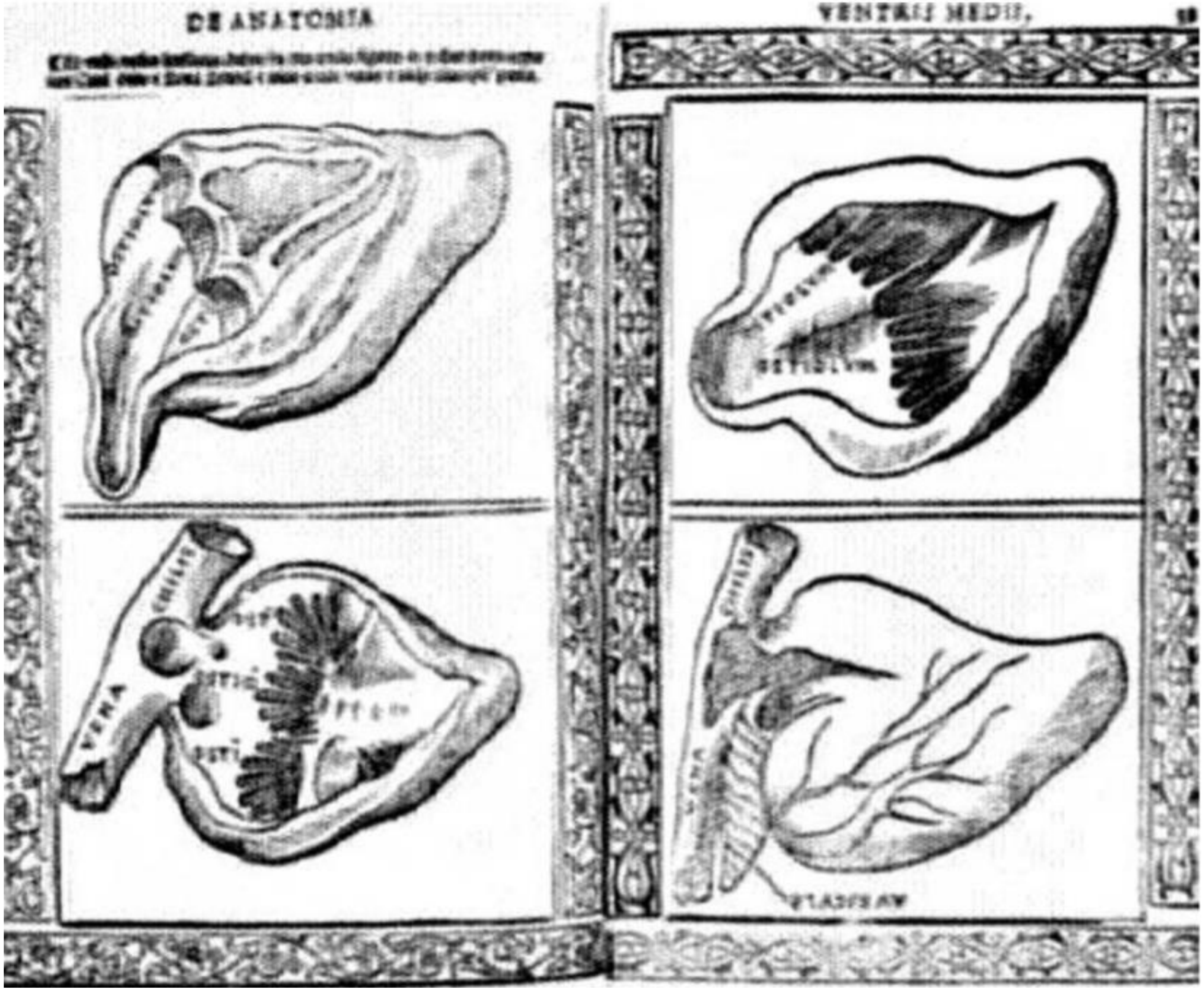


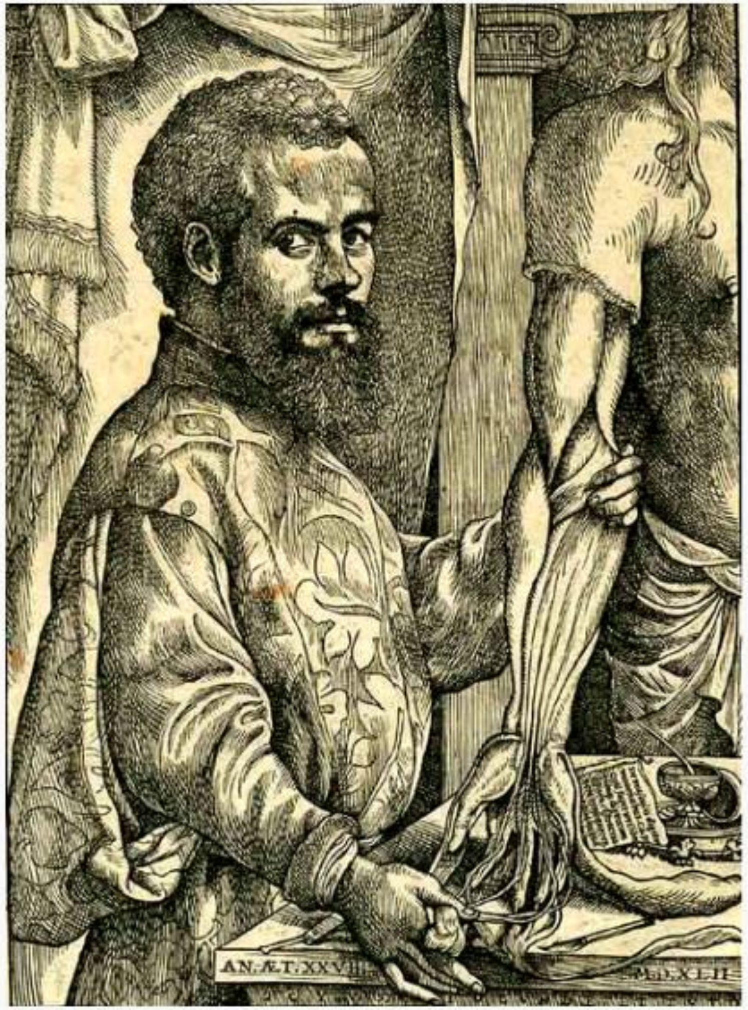
Illustration of the heart in early Chinese medicine. Adapted from Welcome Library London. Reference Yin 11/1529 Ma 75, External reference Wang Shumin 75 and external reference Vivienne Lo.



Aristotle’s heart sketches. Stanford University.
https://web.stanford.edu/class/history13/earlysciencelab/body/heartpages/4heart.jpg

The study of the heart and great vessels has expanded since the days of Andreas Vesalius, the great 16th-century anatomist who recognized the impact of anatomy on the practice of medicine.

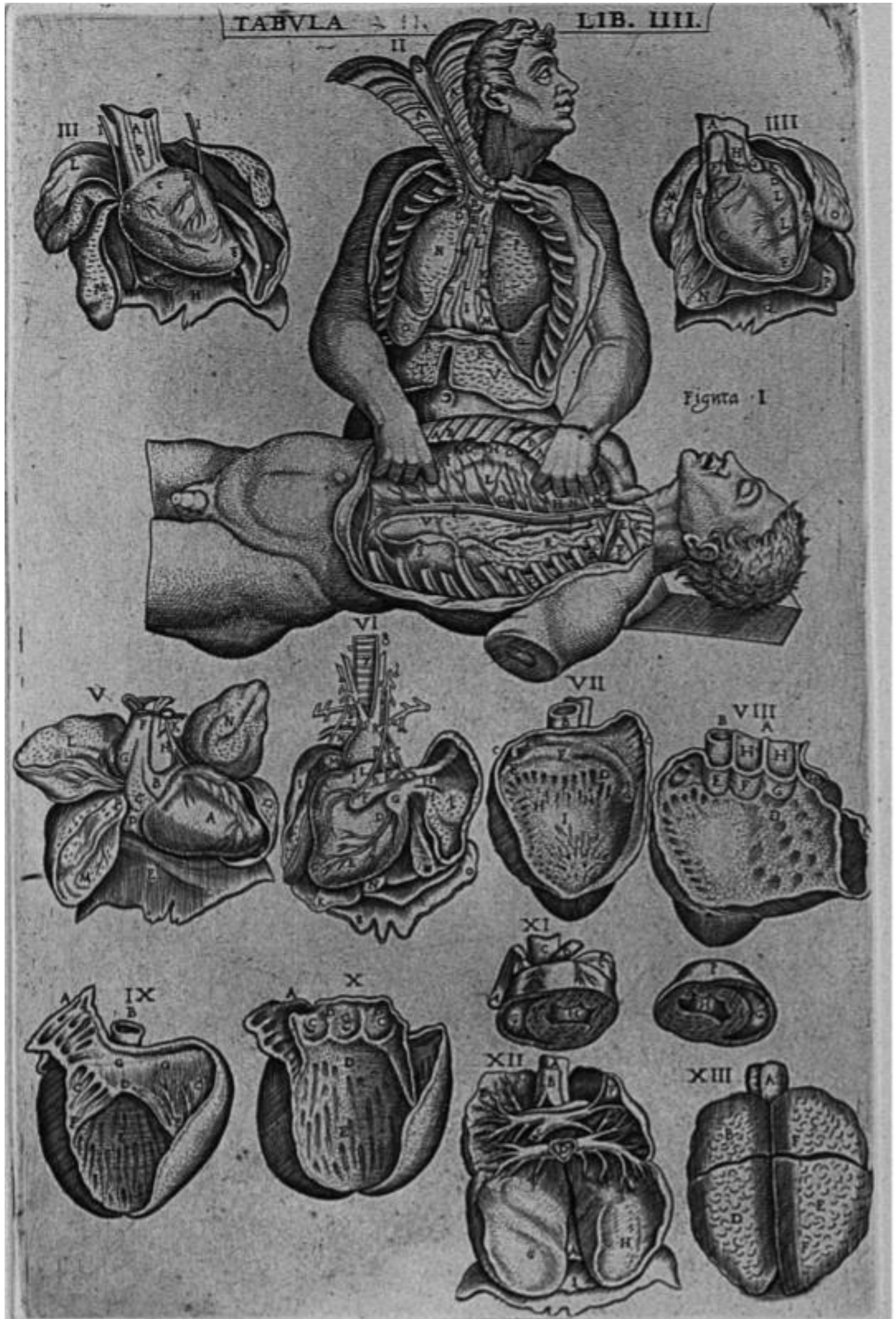
Andreas Vesalius



A portrait of Vesalius from *De humani corporis fabrica*

1 December 1514 – 15 October 1564

He was a 16th-century Flemish anatomist, physician, and author of one of the most influential books on human anatomy, De humani corporis fabrica (On the Fabric of the Human Body). Vesalius is often referred to as the founder of modern human anatomy. He was born in Brussels, which was then part of the Habsburg Netherlands. He was professor at the University of Padua and later became Imperial physician at the court of Emperor Charles V. Andreas Vesalius is the Latinized form of the Dutch Andries van Wesel. It was a common practice among European scholars in his time to Latinize their names. His name is also given as Andrea Vesalius, André Vésale, Andrea Vesalio, Andreas Vesal, André Vesalio and Andre Vesale. Vesalius was born as Andries van Wesel to his father Andries van Wesel and mother Isabel Crabbe on 31 December 1514 in Brussels, which was then part of the Habsburg Netherlands. His great grandfather, Jan van Wesel, probably born in Wesel, received a medical degree from the University of Pavia and taught medicine in 1528 at the University of Leuven. His grandfather, Everard van Wesel, was the Royal Physician of Emperor Maximilian, while his father, Anders van Wesel, served as apothecary to Maximilian, and later valet de chambre to his successor Charles V. Anders encouraged his son to continue in the family tradition and enrolled him in the Brethren of the Common Life in Brussels to learn Greek and Latin prior to learning medicine, according to standards of the era.



Andreas Vesalius: two figures with their thoracic cavities exposed, each dissecting the other, together with illustrations of the heart and the lungs. Engraving 1568. Welcome Library London (reference no. 27185i).
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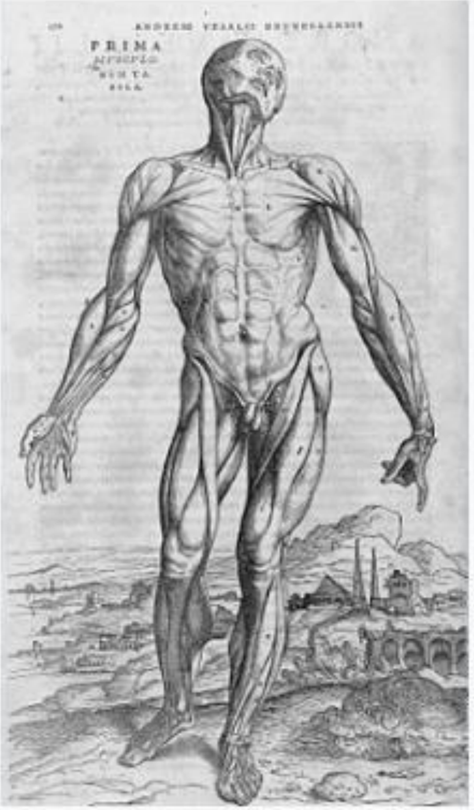
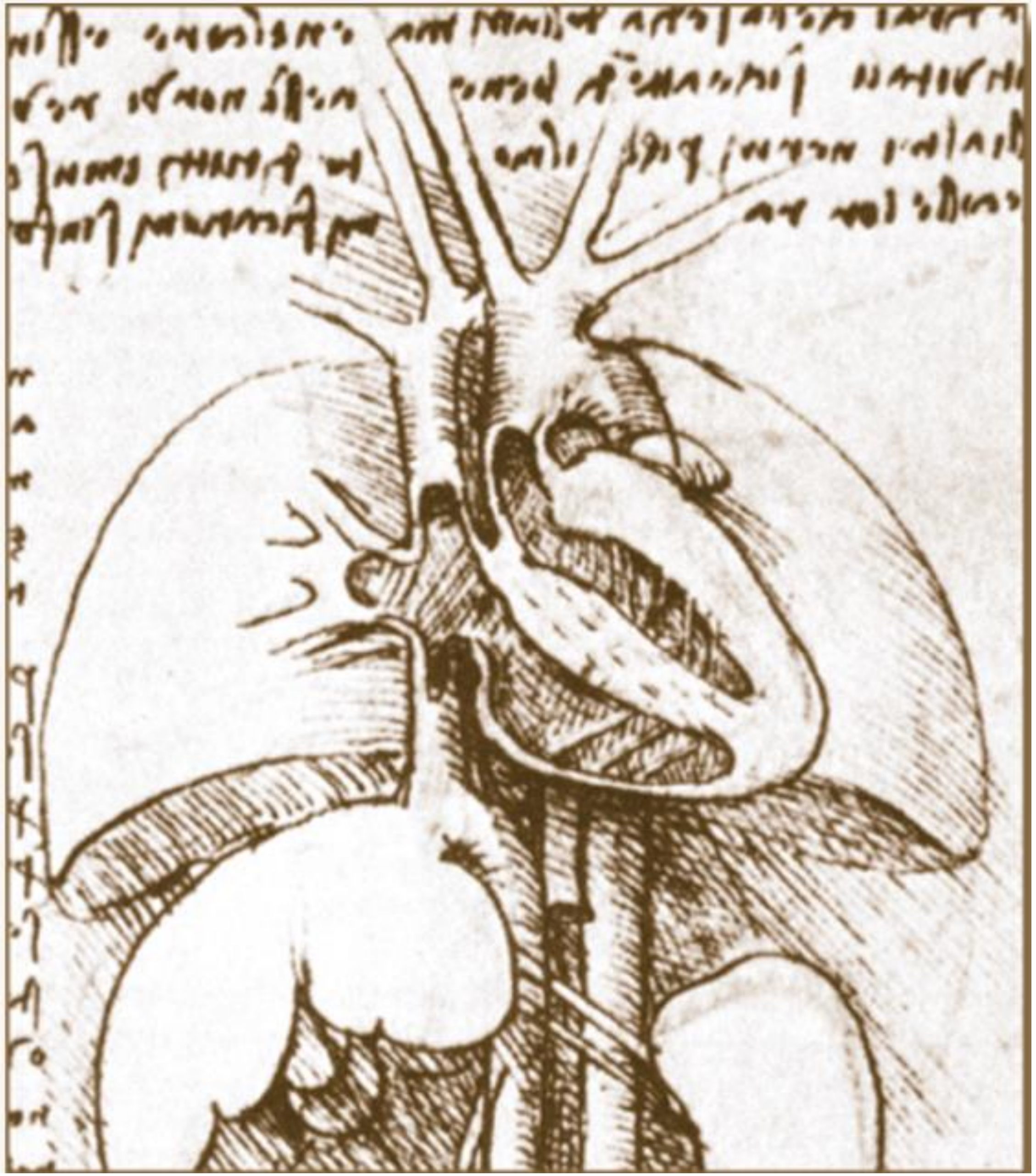
In 1543, Vesalius asked Johannes Oporinus to publish the book De humani corporis fabrica (On the fabric of the human body), a groundbreaking work of human anatomy he dedicated to Charles V and which many believe was illustrated by Titian's pupil Jan Stephen van Calcar. About the same time he published another version of his great work, entitled De humani corporis fabrica librorum epitome (Abridgement of the Structure of the Human Body) more commonly known as the Epitome, with a stronger focus on illustrations than on text, so as to help readers, including medical students, to easily understand his findings. The actual text of the Epitome was an abridged form of his work in the Fabrica, and the organization of the two books was quite varied. He dedicated it to Philip II of Spain, son of the Emperor. The Fabrica emphasized the priority of dissection and what has come to be called the "anatomical" view of the body, seeing human internal functioning as a result of an essentially corporeal structure filled with organs arranged in three-dimensional space. His book contains drawings of several organs on two leaves. This allows for the creation of three-dimensional diagrams by cutting out the organs and pasting them on flayed figures. This was in stark contrast to many of the anatomical models used previously, which had strong Galenic/Aristotelean elements, as well as elements of astrology. Although modern anatomical texts had been published by Mondino and Berenger, much of their work was clouded by reverence for Galen and Arabian doctrines. Besides the first good description of the sphenoid bone, he showed that the sternum consists of three portions and the sacrum of five or six, and described accurately the vestibule in the interior of the temporal bone. He not only verified Estienne's observations on the valves of the hepatic veins, but also described the vena azygos, and discovered the canal which passes in the fetus between the umbilical vein and the vena cava, since named the ductus venosus. He described the omentum and its connections with the stomach, the spleen and the colon; gave the first correct views of the structure of the pylorus; observed the small size of the caecal appendix in man; gave the first good account of the mediastinum and pleura and the fullest description of the anatomy of the brain up to that time. He did not understand the inferior recesses, and his account of the nerves is confused by regarding the optic as the first pair, the third as the fifth, and the fifth as the seventh. In this work, Vesalius also becomes the first person to describe mechanical ventilation. It is largely this achievement that has resulted in Vesalius being incorporated into the Australian and New Zealand College of Anesthetists college arms and crest.



Vascular and circulatory systems

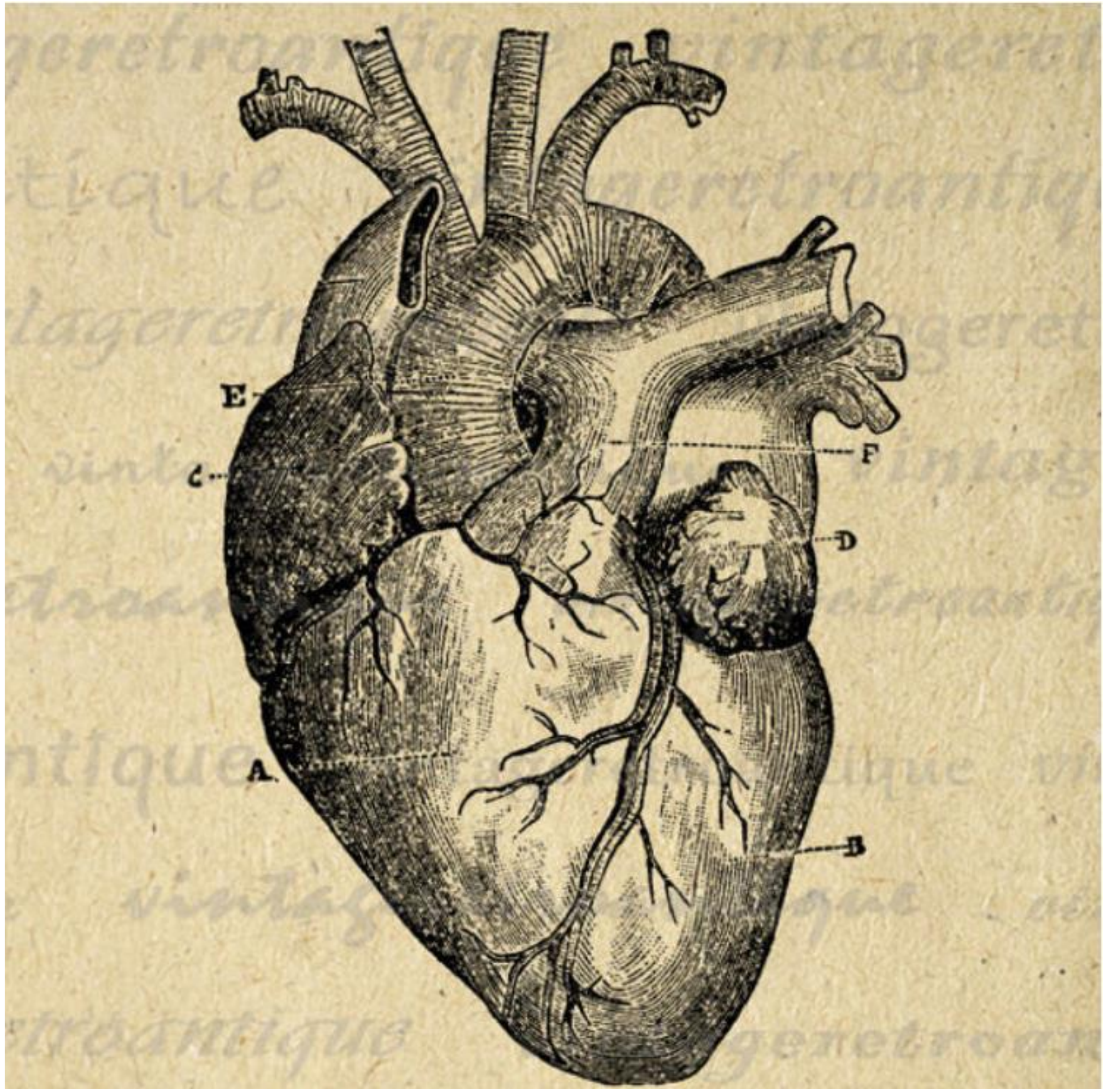
Vesalius' work on the vascular and circulatory systems was his greatest contribution to modern medicine. In his dissections of the heart, Vesalius became convinced that Galen's claims of a porous Interventricular septum were false. This fact was previously described by Michael Servetus, a fellow of Vesalius, but never reached the public, for it was written down in the "Manuscript of Paris", in 1546, and published later in his Christianismi Restitutio (1553), a book regarded as heretical by the Inquisition. Only three copies survived, but these remained hidden for decades, the rest having been burned shortly after publication. In the second edition Vesalius published that the septum was indeed waterproof, discovering (and naming), the mitral valve to explain the blood flow. Heart: Vesalius believed that cardiac systole is synchronous with the arterial pulse.He not only verified Estienne's findings on the valves of the hepatic veins, but also described the azygos vein, and discovered the canal which passes into the fetus between the umbilical vein and vena cava. Heart.Through his work with muscles, Vesalius believed that a criterion for muscles was their voluntary motion. On this claim, he deduced that the heart was not a true muscle due to the obvious involuntary nature of its motion. He identified two chambers and two atria. The right atrium was considered a continuation of the inferior and superior venae cavae, and the left atrium was considered a continuation of the pulmonary vein. He also addressed the controversial issue of the heart being the centre of the soul. He wished to avoid drawing any conclusions due to possible conflict with contemporary religious beliefs. Base of the brain, showing the optic chiasma, cerebellum, olfactory bulbs, etc. Against Galen's theory and many beliefs he also discovered that there was no hole in the septum or heart.



Four-chamber tomographic section of the heart as illustrated by Leonardo da Vinci. Note the thin-walled right ventricle and thick-walled left ventricle and detailed anatomic connections.

Leonardo da Vinci

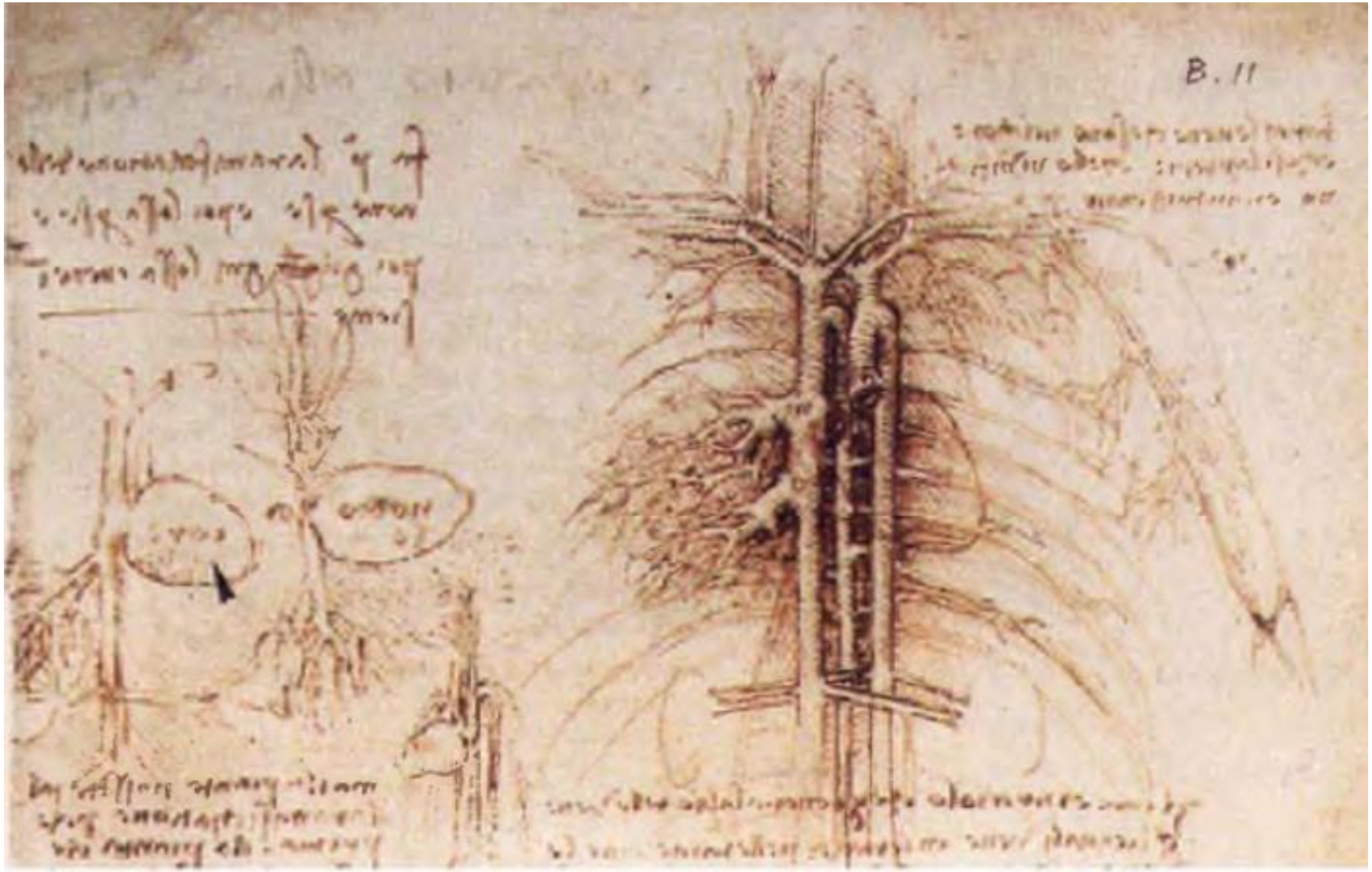
The heart has four chambers, or "rooms"



The upper rooms are called the "atria" ("atrium" means room in Latin), while the lower rooms are called "ventricles" (meaning "little belly" in Latin). Before da Vinci, only two chambers were thought to exist.

The "doors" between the chambers are tiny valves. Da Vinci made exquisite glass models of the valves, watching water containing tiny grass seeds swirl through them, in order to better understand their action.

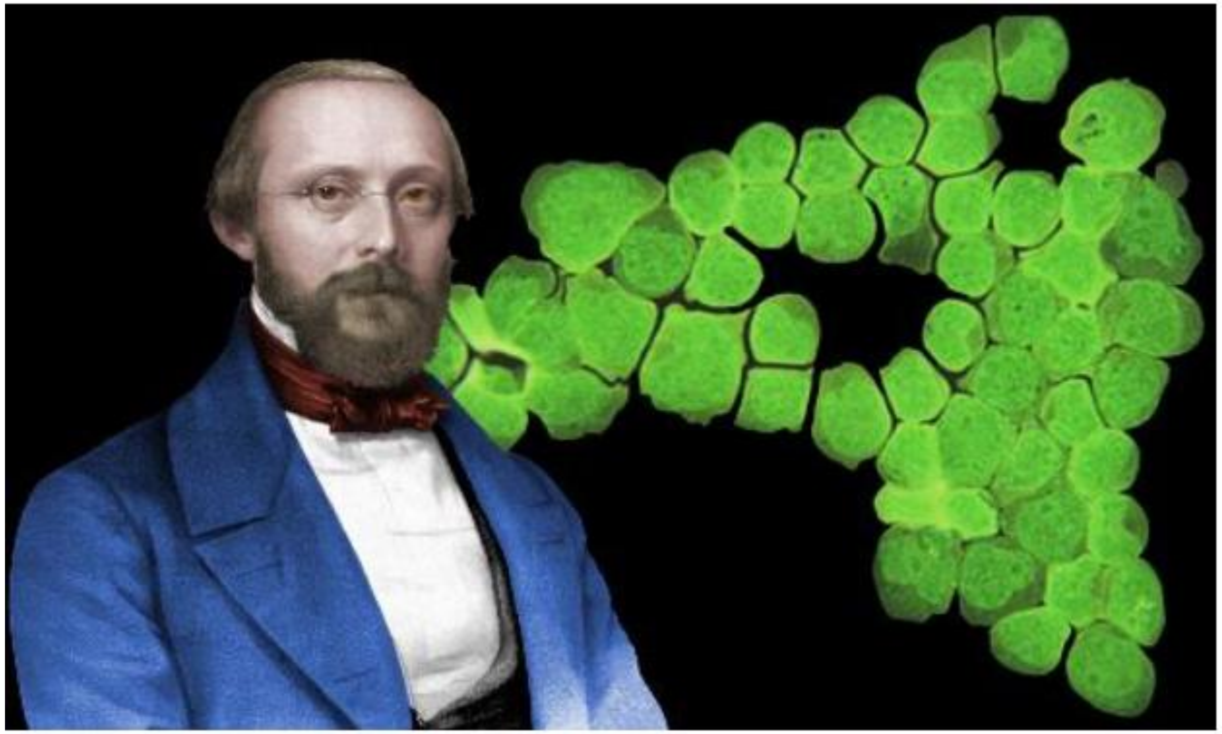
Your blood vessels form a "vascular tree" inside you



Inspired by botany (another of his interests), da Vinci drew some detailed drawings of human blood vessels: the heart is portrayed as a "seed", with vessels coming out of it as if they were roots and branches of a magnificent vascular tree. He saw that the further the vessels are from the heart, the finer they become. This was pioneering work: it was almost 200 years later when the tiniest blood vessels (capillaries) were first discovered, in the lung of a frog.

During the European Renaissance, the tomographic approach to the study of cardiac anatomy became popular because of its artistically based correlations. This is vividly depicted in the drawings of Leonardo da Vinci, the first comparative anatomist since Aristotle. During the ensuing nearly 400 years, however, interest in cardiac anatomy was very sporadic and limited to a few zealous and pioneering physicians, anatomists, and artists. The 19th century ushered in the era of anatomic dissection for the study of physiologic and pathophysiologic processes, and correlations. Virchow in 1885 described the inflow-outflow method of cardiac dissection, which followed the direction of blood flow. It was quick and simple and became the dissection method of choice. The works of Virchow and Osler paved the way to understanding the pathophysiologic basis of such diseases as pulmonary embolism, endocarditis, and heart failure.

Rudolf Virchow



Lived 1821 – 1902.

Rudolf Virchow was an eminent pathologist and politician, widely regarded as one of the greatest and most influential physicians in history. A founding father of both pathology and social medicine, Virchow analyzed the effects of disease in various organs and tissues of the human body. He identified that diseases are caused by malfunctioning cells.

A man of boundless energy, he simultaneously had four careers: medical scientist, editor of several medical journals, politician, and anthropologist. Although he played a tremendous part in ridding medicine of unscientific practices, he also made some rather large scientific errors.

Beginnings

Rudolf Ludwig Carl Virchow was born on October 13, 1821 in the town of Schivelbein, in the German kingdom of Prussia. Today the town is called Świdwin and lies in Poland. His father was Carl Christian Siegfried Virchow, a farmer, and town treasurer of Schivelbein; his mother was Johanna Maria Hesse. The couple were not especially well-off financially and Rudolf was their only child. His parents loved the natural world and passed this love on to their son, taking him on bird watching trips. Rudolf attended elementary school in Schivelbein. From his earliest days at school, he seems to have been exceptionally gifted intellectually, so much so that his parents paid for extra lessons to push him forward. From elementary school he progressed to the Gymnasium (a high school for academically strong students) in Köslin, about 40 miles from his hometown.Rudolf’s high school curriculum was classical, with heavy emphasis on Greek and Latin. This was not a problem for Rudolf, who had a passion and remarkable ability for learning languages. In addition to Greek and Latin, he also learned Dutch, English, French and Hebrew. In his spare time between high school and medical school he taught himself Italian. He graduated from high school in 1839, aged 17. Abandoning his original idea of becoming a pastor – he didn’t think his voice was strong enough to be an effective preacher – he won a scholarship to study medicine at the Friedrich-Wilhelms University in Berlin, Prussia’s capital city. Completing his course in 1843, he spent short spells in a number of different medical jobs. His passion was pathology – the study of diseases.

Politics in Brief A man with incredible energy levels, Virchow enjoyed an important political career in addition to his scientific career. Here we’ll be concerned mainly with the science. Suffice to say that Virchow’s politics were liberal. He promoted better education, better living conditions, and better health for the poor. These political beliefs coincided with his ideas for social medicine. Virchow was elected to the German Parliament in 1880 to represent the party he helped found, the German Progress

Party. He had a sharp tongue, and his political opponents became wary of his sarcasm. Virchow was ardently anti-Catholic, believing the Catholic Church’s influence led to bad outcomes for society and the poor.

Rudolf Virchow’s Contributions to Science and Pathology

Autopsies and Leukemia

Virchow carried out the first systematic autopsies involving microscopic examination of tissue. One such autopsy in 1845 led to his first published contribution to science. Virchow identified and named the disease leukemia and offered the best description of it available. He named the disease by combining the Greek words leukos (white) and aima (blood). Even in his earliest work he focused heavily on cells.

Outflanking the journals that blocked publication of his work

In 1847 Virchow started a new job, teaching pathological anatomy at the University of Berlin. Although he had once believed his voice too weak to preach, he became a supremely self-assured teacher and researcher. He was also ambitious, and had grown increasingly frustrated by the editors of German medical journals. They refused to publish some of his research papers: in Virchow’s opinion they were hamstrung by out-of-date ideas about medicine. In his new teaching job he met Benno Reinhardt, another young physician who shared his dim view of the medical journals. Virchow and Reinhardt decided to bypass the journals’ stuffy editors entirely. They launched their own journal, Archive for Pathological Anatomy and Physiology and Clinical Medicine. This new journal insisted all medical contributions should be based on robust, well-researched science. Virchow utterly rejected medical practices that had persisted for millennia which he believed had no scientific basis, such as Galen’s use of the ‘humours.’ Virchow and Reinhardt’s journal has been remarkably resilient. Today it is still one of the leading medical journals, now called Virchows Archiv. Sadly its founding co-editor Benno Reinhardt died young in 1852. Virchow, who had a prodigious appetite for hard work, became the journal’s sole editor until his own death in 1902.

Epidemics and Public Health

Early in 1848 the Prussian Government sent Virchow to Upper Silesia to investigate a typhus epidemic that had begun the previous year and was claiming thousands of lives. After studying the situation, Virchow characterized the peasants of Upper Silesia as lazy and unhygienic. He was shocked at the extreme poverty they lived in and their extremely poor diets. He blamed their plight on the combined effects of the Catholic Church sapping their ambition and local landowners removing any wealth generated in Upper Silesia to be spent elsewhere. The medical consensus at the time, accepted by Virchow, was that diseases like typhus were caused by ‘miasma’ – bad air caused by rotting matter. Virchow believed malaria was caused by rotting vegetable miasma, while typhus was caused by rotting animal miasma. So, although he rejected some doctrines of medicine taught in ancient times by Galen, he did not question the truth of miasmas.

Virchow did not recognize that epidemics are spread by microorganisms. He formed the view that the main cause of the epidemic in Upper Silesia was the terrible conditions most of the people were living in. He decided that if living conditions could be improved, there would be no more epidemics. Epidemics, he said, were best treated politically rather than medically. This is not entirely correct. However, he was correct to say that improving people’s living conditions, hygiene, and diets would be highly beneficial to their general health and well-being. And, although he did not know it, better hygiene slows the spread of the microorganisms that cause epidemics such as typhus, and more recently Ebola, bird flu, and SARS

The Beginning of Social Medicine

Never slow to act on his beliefs, in July 1848 Virchow founded the weekly magazine Medical Reform to promote his new concept of social medicine and his idea that: “physicians are the natural advocates of the poor”. The magazine ran for about a year before folding, but in that time it was highly influential in promoting improved public health for everyone in Germany, including the poorest.

How do Cells Form?

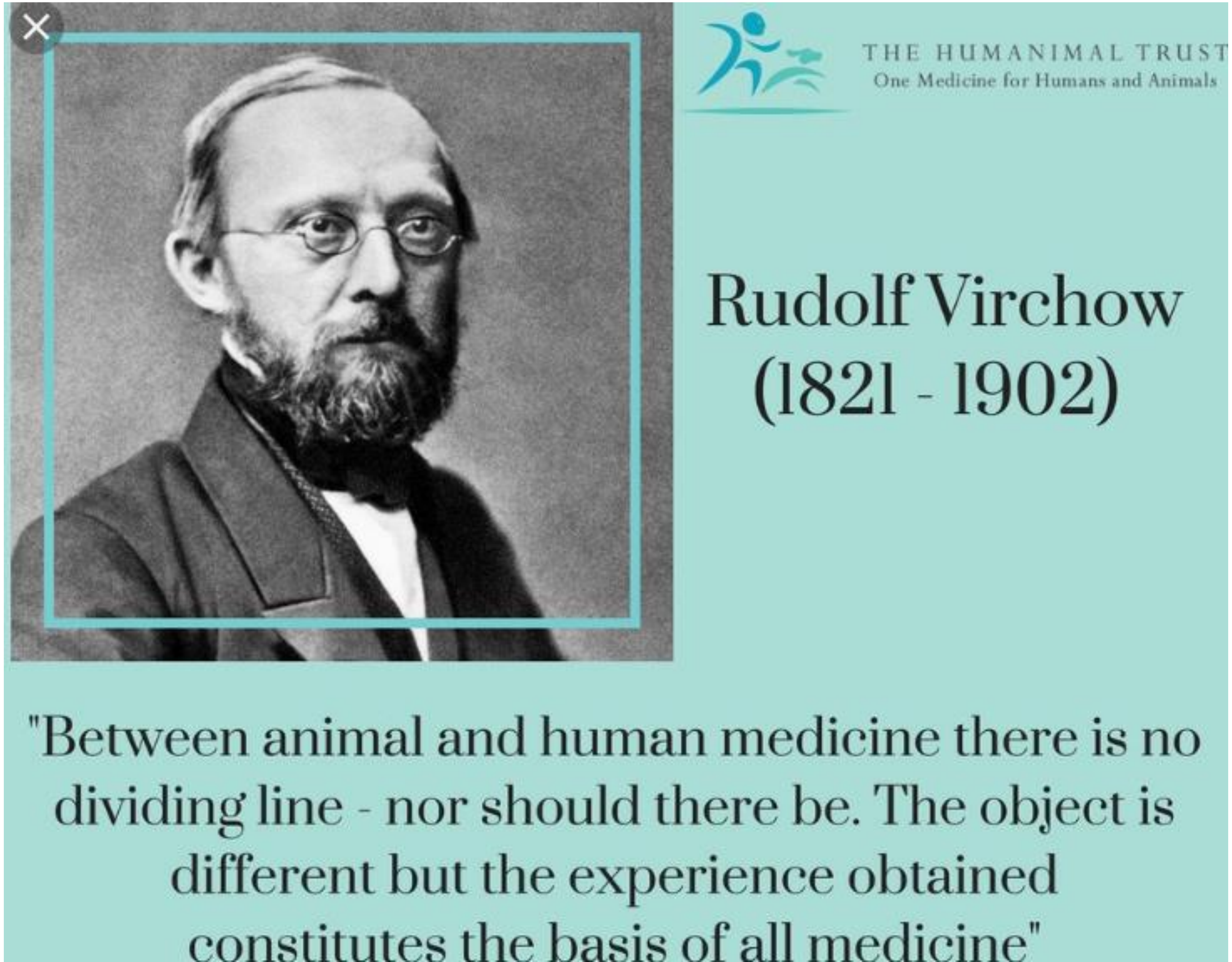
In 1849 Virchow moved to University of Würzburg and began a program of serious research into the roles cells play in the body and in disease. Scientists believed imbalances in the body created blastema in which disease cells start to grow. This belief began changing in 1855 when Virchow, aged 34, published an essay in which famously he declared: “Every cell arises from another cell.” Although he was not the first person to suggest this, people only began to take serious notice after Virchow said it. It was a turning point in biology.

Cellular Pathology

In 1856 Virchow returned to Berlin to the Chair of Pathological Anatomy at the Friedrich-Wilhelms University.

In 1858 he published Cellular Pathology, a groundbreaking book of 20 lectures he had given at the university, which laid the foundations of modern pathology and indeed of modern medical theory. Simply put, Virchow established that all diseases can be traced to cells. Diseases attack normal cells and cause them to malfunction. A whole organism does not get sick; each disease affects a particular set or sets of an organism’s cells, not all of its cells. Different diseases affect different types of cell.

Renewed interest in the study of cardiac anatomy and pathology was facilitated by the rise in autopsy rates in Europe and North America during the first half of the 20th century. Herrick described the clinical features of coronary thrombosis. Later, Blumgart, Schlesinger, and Zoll advanced our understanding of coronary artery disease through elegant clinicopathologic correlations.



Rudolf Virchow

Rudolf Virchow was a male medical doctor and politician. He is well known for his knowledge and understanding of diseases, he is mainly known for his contribution to the cell theory

Sadly in 1902 Spetember 5 Rudolf died of heart failure. This was 50 years after creating his journal (Virchows Achiv). Rudolf remaind buried in Berlin, Germany, on Old Street, Matthews Cemetery.

Gender: Male

Religion: Agnostic

Race: White

Sexual Orientation: Straight

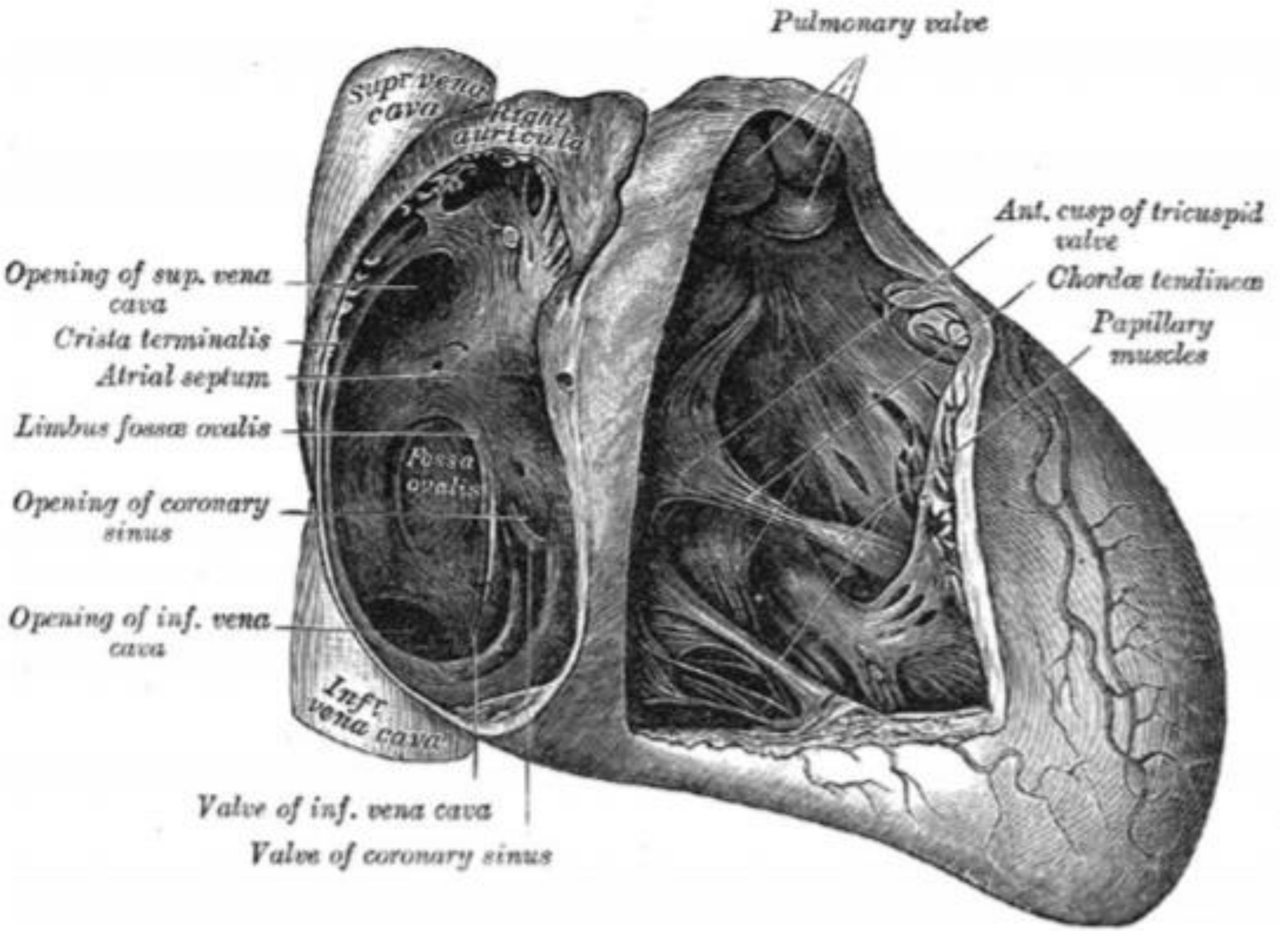
Occupation: Doctor & Politician

Nationality: Germany

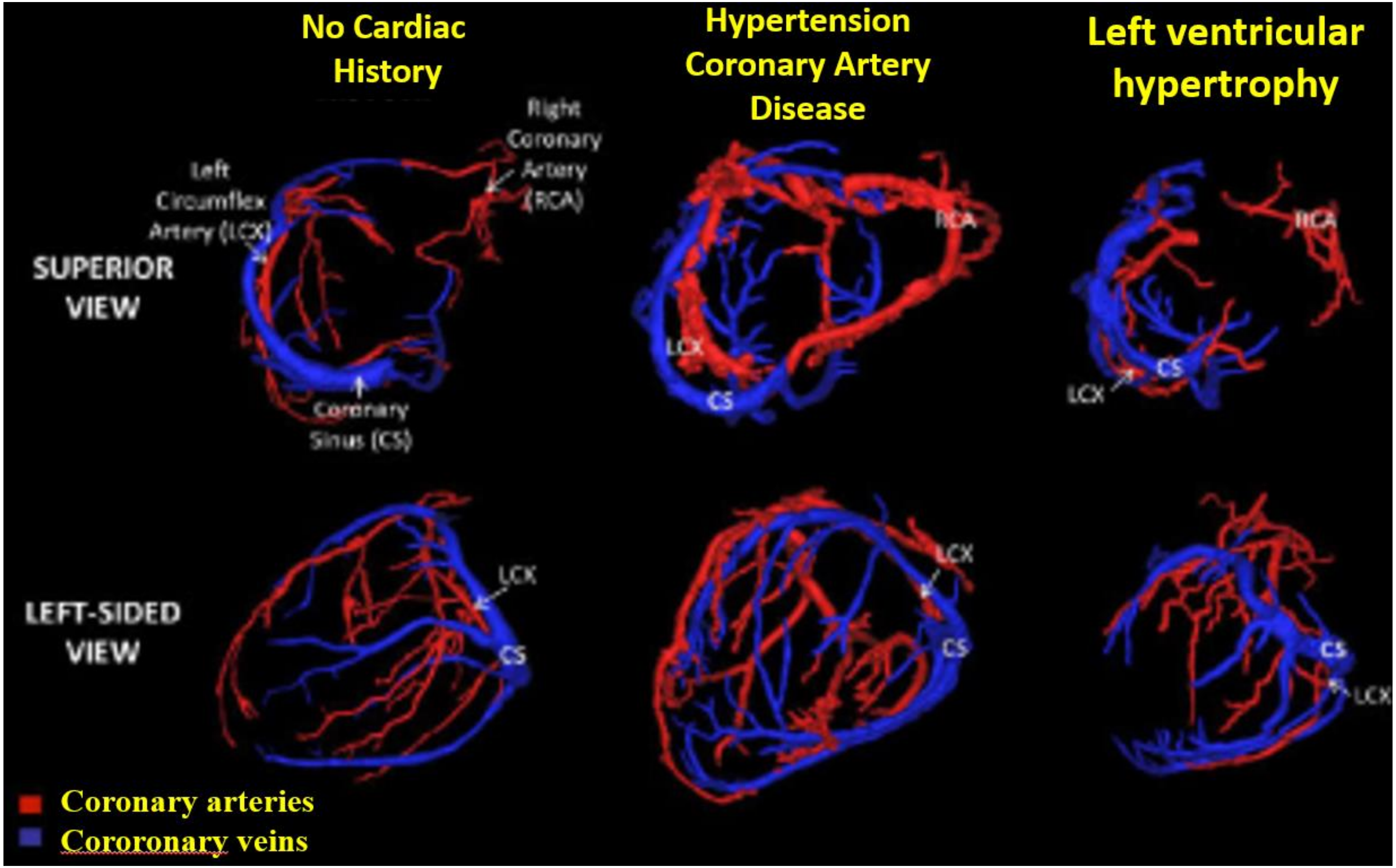
Executive Summary: Pathology and Progressive Politics

Cell Theory Introduction

britannica.com



Valve of coronary sinus, as described by Thebesius. Adapted from Carter HVHenry Gray (1918) Anatomy of the Human Body. Gray's Anatomy, Plate 493. Public Domain.



The description of the major coronary arteries, such as the anterior descending and posterior descending, is attitudinally incorrect; as the heart is oriented in the body, the surfaces are actually superior and inferior. (Hill, 2009)

Time period	Main cardiac anatomy concepts
Pre-Hippocratic: Ancient Egypt (3500 B.C)	Cardiocentric theory of the anatomy of the cardiovascular system.
Pre-Hippocratic: China and India (2600 B.C)	Relationship between the blood, the heart, and the pulse.
Pre-Hippocratic: Greece (500 B.C)	Coexistence of blood and "pneuma" or air.
Hippocratic (460 B.C)	• Consolidation of the doctrine implying that the heart is the center of the cardiovascular system. • Early recognition of vessels and semilunar valves.
Early post-Hippocratic (384 B.C)	• Identification of the connections between the heart and the lungs. • Early description of the chordae tendinae.
Alexandrian (300 B.C)	• Anatomical differentiation of arteries and veins. • Description of the four valves of the heart.
Roman (130 B.C)	• Identification of the contractile myocardial fibers. • Discovery of the diaphragm or interventricular septum. • Differentiation between inlet and outlet valves.
Medieval Islamic (1000 A.D)	• Description of the coronary vessels. • Early understanding of pulmonary circulation.
Medieval European (1400 A.D)	• Establishment of the structure of the heart as a four-chambered organ. • Discovery of the moderator band of the right ventricle. • Naming of the "mitral valve"
Seventeenth Century	• Discovery of the connection between air and blood in the lungs. • Detailed explanation of the pulmonary circulation. • Description of the muscular structure of the heart. • First description of the heart as a pump. • Discovery of the intervenous tubercle of Lower.
Eighteenth Century	• Initial description of heart lymphatics. • Detailed description of the coronary vessels and coronary sinus. • Discovery of Vieussens and Thebesian valves. • Description of the mitral subvalvular apparatus.
Nineteenth and Twentieth Centuries	• Innervation of the cardiac system. • Discovery of the conductive bundle of His. • Discovery of the conductive Purkinje fibers. • Description of the bundle branches. • Discovery of the AV node and description of the AV conducting system.