

## The anatomy of Frank Netter (1906-1991)

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### Abstract

Frank Henry Netter (1906-1991), medical doctor and illustrator whose works became standard reference materials in medical schools and libraries around the world. His unique talent, style, technique, knowledge and remarkable body of work, comprises more than 4,000 medical illustrations mostly in Ciba collection, Clinical Symposia and his atlas. Netter's painting style is his input to medical education and learning of human anatomy. Frank Netter's 'Atlas of human anatomy' is one of the most used books in medical schools worldwide.

**Key words:** Frank Netter, human anatomy, medical education, medical illustrations



**Frank Netter (1906-1991)** Source:  
<https://es.findagrave.com/memorial/117617279/frank-henry-netter#view-photo=153018167>

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## Introduction

The history of medical illustration in its broadest sense, taking in all visual depictions of the human body or its separate parts for the purpose of documentation, teaching, training or in the practice of medicine, is closely integrated with, and influenced by historical, social and technological developments through the ages. These developments affected the content of the illustrations, the artists themselves and the techniques by which the representations were made, reproduced and disseminated, from prehistoric until today. For ages, the study of medical illustration has been essential to our understanding of human anatomy, illness processes, and medical treatments. It has consistently changed and grown throughout its history in response to advancements in technology, modifications in medical procedure, and evolving demands of society (1,2). Before there were written words, there were pictograms. These pictorial representations date back thousands of years and predated history. From the early wall paintings in caves to the recent advent of computer graphics, medical illustrators have employed a variety of techniques and materials (for examples: stone, metal, ceramic, porcelain, bamboo, silk and others) to enrich the art of medicine. Over the centuries, medical illustrators have captured the variety of physical findings observed in the clinical, surgical, or postmortem settings (3). Among many excellent medical illustrators, Frank Netter's works stand out. With a trajectory of over 50 years, Netter's medical illustrations are standard reference material in medical schools and libraries all over the world. (4).

The aim of this paper is to present a brief review of Frank Netter's input, through his innovative medical illustrations to teaching/learning of human anatomy and medicine.

## Childhood and training in Arts

Netter's ancestors came from the Alsatian region of France. Frank Henry Netter was born on April 25, 1906, in New York, United States of America. He was the third child of Charles and Esther Netter. They were working class immigrants who owned a stationery store in the theater district of New York. From an early age he showed aptitude for art and became interested in art. While his fascination with the human form increased, he began to observe in detail what people looked like, how they moved and carried their bodies. His capacity for capturing these physical nuances later became the signature of his artwork (4,5). Netter went to public school and drew pictures for the school's magazine. While in high school, he was admitted to the National Academy of Design. During the day, he went to school but went to art class at night. During his studies at the National Academy of Design he began to draw nude figures. At New York's City College, Netter drew portraits and cartoons for the school's yearbook. Frank Netter had already established himself as an accomplished commercial artist in the 1920s when, on the advice of his parents, he switched careers (5).

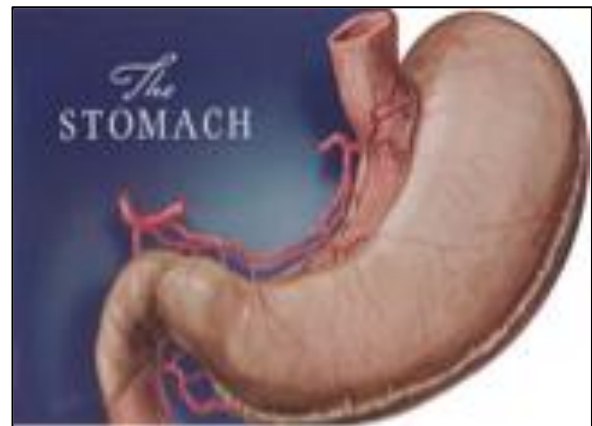
## Medical career

In 1927, Netter began studying medicine at the University of New York. Frank Netter received his degree in Doctor of Medicine in 1931. He worked then at Bellevue Hospital and joined the outpatient surgical service at Mount Sinai Hospital (5,6). During his studies and training as a surgeon Netter found that it was easier for him to draw than to take notes in which words were not sufficient. To this respect, he commented "My notebooks were chock-full of illustrations. It was the only way for me to recall all of it" (2). During his years as a student, the sketches in his notebooks came to the attention of several medical professors, enabling him to pay his rent and tuition by illustrating conferences, articles and medical textbooks (7). But it was the time of the great depression in the United States (it was the 30s of the 20<sup>th</sup> century) and even surgeries were few and far between. Frank Netter continued paying his rent thanks to being a medical illustrator and soon his surgical practice dwindled.

This was a time when the pharmaceutical industry was transforming the field of Medicine through the development of new medicines that changed clinical practice. The pharmaceutical companies were making great discoveries and medical knowledge was advancing rapidly. Early in his career as a medical illustrator Netter created pictures published by several different pharmaceutical companies, including Armour Laboratories, Winthrop Chemical Company, and Pfizer & Co.

## A widespread and successful relation

In the late 30s of the 20<sup>th</sup> century pharmaceutical companies were seeking to provide a service to the medical community by publishing medical educational materials that became Netter's greatest patron. In 1936 one of his first work for Ciba company was designed a heart-shaped folder which was sent to the doctors. Surprisingly, many of the medical doctors wrote back requesting more heart illustrations without the advertising copy. Netter focused on designing similar advertisements for products representing other organs and they were all extremely well received (Figure 1).



**Figure 1. The Stomach (1938).** Source: <http://www.codex99.com/anatomy/images/netter/stomach>.

He drew the pictures in more than 200 monographs under the title *Clinical Symposia* since 1938 to 1985 (8). Netter was asked to work on an exhibit for the exposition at the Golden Gate International Exposition in 1939. He presented *Transparent Woman* for the exposition in San Francisco's Golden Gate.

One of his 3D sculptures showed, in successive illustrations, what happens inside a woman's body; from work of hormones (menstrual cycle) to pregnancy and physical and sexual development in women. The exhibit, lasting just 15 minutes, used a woman's voice to tell the story of what was happening inside her body. It was quite innovative at the time and was greeted with rave reviews (3,5).

During World War II, as a United States army officer, he illustrated several first aid manuals for combat troops on hygienic conditions in the field and survival in tropical areas. His images also showed how to take X rays, administer first aid and perform procedures on saving lives in battle.

In 1948, Frank Netter was commissioned to create the Ciba-Geigy collection of medical illustrations: a system-by-system encyclopedic series of 13 volumes on anatomy, physiology, pathology and histology of the human body and pertinent clinical characteristics of diseases which could appear in each system. It took 40 years to complete, with the last part being published in 1993, two years after his death. They became the much-consulted Ciba collection of medical illustrations (4). Netter consulted dozens of medical experts throughout his career during the creation of his paintings including Michael DeBakey, Albert Sabin and Paul Dudley White. He checked with them especially for design projects documenting new medical breakthroughs, such as computerized axial tomography, the replacement of common organs and the first artificial heart transplant. He wrote and illustrated a book titled, "Fad Diets Can Be Deadly: The Safe, Sure Way to Weight Loss

and Good Nutrition" in 1975. William Devries in 1980 asked Netter to be present at the first artificial heart transplant that was ever performed, a procedure which Netter illustrated in wonderful detail. Ciba collection of medical illustrations is a significant contribution to the study of medicine and human anatomy.

Frank Netter considered the atlas of human anatomy published in 1989, his "crowning glory". The atlas rapidly became the most extensively used human anatomy atlas in medical schools worldwide and it is currently published in 16 languages (6). Netter's fabulous capacity for visualizing and simplifying the complex structures and regions of human anatomy are best exemplified in his human anatomy atlas, a fabulous, easy to understand compendium with wonderful illustrations.

Although best known for his Atlas of Human Anatomy and Ciba Collection of Medical Illustrations some of Netter's other projects include the Clinical Symposia series. The high medical excellence of the Netter's books was also the product of an editorial process that allowed for extensive discussions between the artist and the leading medical specialists who provided the text (2,5,9). Icon Learning Systems acquired the Netter Collection in July 2000 and continued to update Frank Netter's original work, as well as adding new drawings commissioned from artists trained in the same style. Subsequently in 2005, Elsevier Inc. purchased the Netter's collection and all publications from Icon Learning Systems.

## His painting technique

Frank Netter would sketch out the picture on thin tissue paper, often quickly, and using graphite transfer paper, and then transfer the image to illustration board. Thereafter, with his masterful brush strokes, he would lay down paint, beginning with the next to darkest colors, then adding next-lighter tones, and continuing with the next-lighter, as the picture came into being. Netter preferred gauche. He created dramatic images, which are excellent illustrations, and powerful teaching aides (2,9).

Netter's sense of humanity and empathy towards patients is one of the characteristics that distinguish his production, more than in other medical illustrators. He stated: "I always attempted to make (of the topic) a live patient, with the appropriate facial expression and so on and so forth to show that this is not a machine we are dealing with but a patient" (5).

Frank Netter spent much more time researching a topic and planning an illustration than executing it. He said that the painting part was much faster. After absorbing as much information as was necessary from multiple sources, he would typically create pencil sketches which would later be copied and transformed into designs in opaque watercolor with shadows and fine details. Always drawing on the complexity and diversity in humans, Netter strived to create faces and bodies in his work that would reflect individual personalities. The result was that disease, and trauma would be viewed in a human light.

The colors of facial expressions he used were totally novel and very attractive. He worried a lot about the human side of the illustrated character such as happy, sad, sore or other (7).

Netter's anatomic drawings, closer to human reality than the ones found in standard anatomical textbooks, enhanced all sorts of clinical contexts. But what made them unique was Netter's capacity for combining medical knowledge and artistic expression into the explanation of medical concepts (2,5,9). Frank Netter said "Medical illustrations have three main functions: First, it helps the student or physician who is studying a subject to clarify in his own mind. His sketches, aided in forming mental image of the subject. Second, it helps to transmit ideas to others, as in a lecture, in a private conversation or in a conference or even in a published article. We transfer the mental image which we have via the paper to another. Third, it serves to preserve ideas for posterity as in a book or any other publication" (2,9).

Netter also referred to the fragile balance between complexity and simplification in the attempt to create an anatomical image. He indicated the importance of drawing pictures that are neither too complex, and therefore unhelpful to read, nor too simplified, and consequently inadequately clear and accurate or even misleading. Among his innovations was the depiction of various aspects of a disease or condition cause, effect, treatment, and complications in a single illustration.



## Epilogue

Frank Netter moved from New York City to West Palm Beach, Florida in the 1970s, but he never retired and continued doing medical illustrations until he was 84 years old. Netter enjoyed his simple entertainments as golf, and afternoon cocktails and cigars. He married twice and had five children and eight grandchildren (7,8,9). When asked if he regretted not having continued his surgical practice, Netter responded that he thought of himself as a clinical doctor with a specialization that encompassed all of medicine: "my field encompassed it all. I have to be a specialist in every field; I have to be able to speak with all doctors in their own terms" (11,12).

Netter traveled extensively to learn first-hand about a variety of diseases and their effects on the human body (4). Frank Henry Netter passed away in New York on September 17, 1991, at 85 years of age (13). Netter's works are currently being updated and developed by new artists, such as Carlos Machado and John A. Craig (14). Among many awards and recognitions throughout his life Frank Netter received Honorary Award for Contribution to the Knowledge of the Musculoskeletal System (American Academy of Orthopaedic Surgeons) in 1988, Honorary Member of Medical Artists' Association of Great Britain (1988), Special Recognition Award of Association of Medical Illustrators (1990), and became Honorary Member, American Association of Clinical Anatomists in 1991. In his honor the medical school of Quinnipiac University established in 2010 was named

after him in New England, United States of America.

## Discussion

Among outstanding medical illustrators throughout history, Frank Netter's art stands out for combining deep intellectual content with aesthetic beauty, clarifying complex concepts in an accessible way. His illustrations are designed from a clinical perspective, highlighting the anatomical relationships most relevant to medical practice. This helps students to understand how anatomy is applied in real clinical situations. Frank Netter has significantly advanced our comprehension of human anatomy and medicine. Netter's work is a practical reference for students and medical doctors of all specialties wishing to become more familiarized with the human anatomy. His work comprises more than 4,000 illustrations.

Netter did not give his name to a new syndrome or invent a life-saving device. Nor did he define any clinical signs. On fact, he barely practiced medicine. But there is no doubt that he has done a lot for several generations of medical doctors. His impressive career as a medical illustrator and his painting style are his inputs to medical education and teaching/learning of human anatomy. Although created for their intellectual content, Netter's paintings are appreciated for their aesthetic qualities, such as their ability to depict the functionality of organs in an outstandingly animated manner.

His works live on in books, illustrations, drawings and electronic products published that enlighten millions of healthcare professionals throughout the world. There are currently more than 50 Elsevier Inc. publications featuring illustrations by Frank Netter.

### Notes on contribution

RRR was involved in the study by conceptualizing the idea, reviewing the literature, formulating the methodological framework, data acquisition, formal analysis designed and writing the original draft and graphics designs. Author declares no competing interests.

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