Frontiers in Medical Illustration: From Netter's Naturalism to a Representation Revolution

Francois I. Luks, Ian Suk, Ni-Ka Ford, Phillip M. Boiselle

Netter's oeuvre has been the go-to reference for generations of anatomy students and practitioners. His ability to depict diseases through the experience of everyday people makes his illustrations relatable, albeit largely focused on the white middle-class. While he may have been a product of his era, we now recognize how a lack of representation in medical illustration leads to health disparities. An inclusive approach to visual communication promotes empathy, cultural humility, humanism – all qualities that make for better doctors.

If, as she is removing your gallbladder, the surgeon identifies the cystic artery before dividing it, and knows where the cystic duct enters the common bile duct – you may thank Dr. Frank H. Netter for that (**Figure 1**). If your endocrinologist recognizes the physical signs of hyperthyroidism (such as exophthalmos, or bulging eyes); your neurologist knows the cranial nerves down pat, your emergency medicine doctor can spot the first signs of a heart attack, a stroke, myxedema, or Ludwig's angina – chances are Dr. Netter helped teach them that, too. Frank H. Netter, MD was a surgeon by training, but is best known by generations of doctors, nurses, advanced practice providers and emergency medicine technicians as "Medicine's Michelangelo (Netter 2013)." From his first detailed painting of the inside of a heart (commissioned by the Ciba pharmaceutical company) to his comprehensive anatomy atlas, Dr. Netter's illustrations have been the go-to references for generations of anatomy students.

How is it that Dr. Netter is the most widely recognized medical illustrator by medical students and healthcare professionals in North America (Miller 2022, Ferrigno 2033)? His atlas of anatomy was neither the first (*Vesalius's De humani corporis fabrica* beat him by more than four centuries), nor the most enduring (*Gray's Anatomy*, now in its 41st edition, has been published since 1858). It is not even the best: purists have remarked on a certain lack of depth, and even some errors (Bogen 2006). The relative absence of detail was a calculated attempt to, in Netter's own words, "achieve a happy medium between complexity and simplification" (Netter 2013).

What sets Netter apart is the naturalistic way in which he approached medical illustration. More than the traditional anatomic plates showing the human body in varying degrees of dissection, Netter's tableaux contextualize anatomy and physiology in a distinctly humanistic way that connects us through visual story-telling.

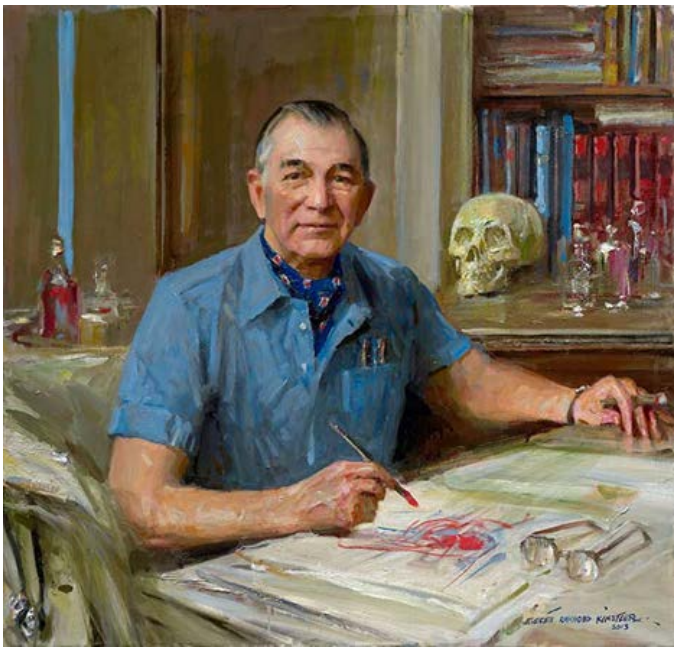

Figure 1. Dr. Frank H. Netter by Everett Raymond Kinstler. Used by permission.

Indeed, Netter compassionately painted disease processes as life challenges faced by individual patients, such as his classic depiction of a middle-aged man stepping out of a restaurant on a cold evening, clutching his chest as he suffers a heart attack (**Figure 2**).

The illustration depicted in Figure 2, like so many others in Netter's extensive oeuvre, offers so much information, which almost act as a mnemonic, or at least as a crutch for the young doctor who tries to remember all the risk factors for myocardial infarction. Visual clues include the Restaurant sign, which hints at a full and rich meal, unhealthy eating habits with too much fat and red meat, and an elevated serum cholesterol level. Additional clues include a cold environment (especially with a sudden drop in ambient temperature, as the blowing snow contrasts with the fogged-up window of the warm dining room);

exertion, as suggested by the heavy briefcase and the stairs he just climbed; and smoking, illustrated by the still-burning cigarette that dropped out of his hand and landed in front of his right foot. Even the fact that he is holding his briefcase in his left hand is a clue, as non-right-handedness has been considered a risk factor for sudden death in the context of coronary artery disease (King 1995).

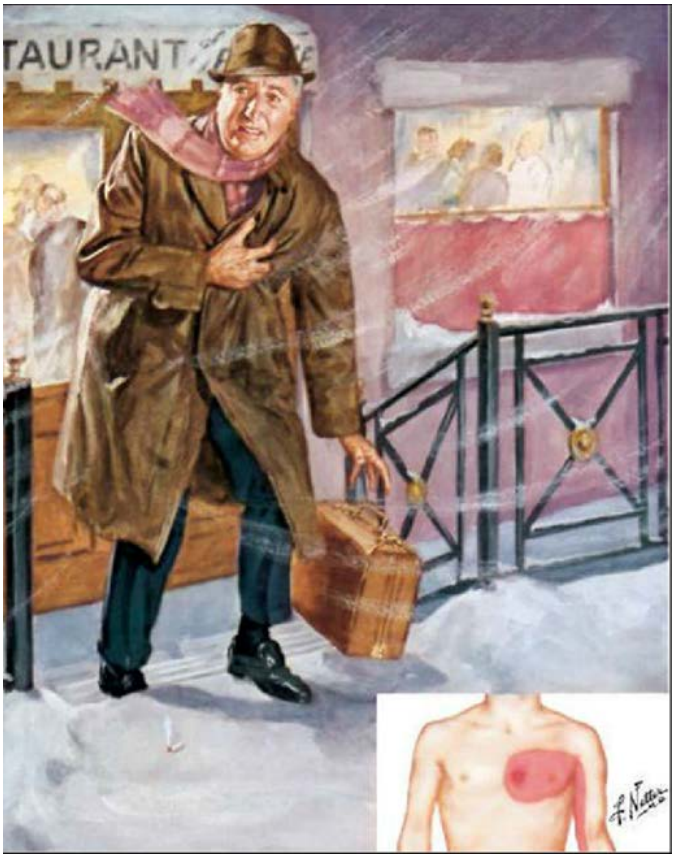

Figure 2. Dr. Frank H. Netter's classic depiction of a white male suffering a myocardial infarction, as he steps out of a restaurant after a copious meal, and into cold weather. Copyright Elsevier, used by permission.

Illustrations such as this one have been etched in the memories of many health care providers through the power of Frank Netter's artistry and storytelling. His ability to depict the complexity and uniqueness of everyday people suffering from health conditions ranging from asthma to depression makes Netter's illustrations accessible and relatable. The accumulation of specific details and "common" risk factors, like the poor man in Figure 2, make Netter's illustrations didactic, but also a little cliché – that of the white middle-aged businessman with type A personality who suffers a heart attack. This stereotype may obscure the fact that heart disease is the leading cause of death in women, and that African Americans are 30 percent more likely to die from heart disease than non-Hispanic whites.

Dr. Netter's style is reminiscent of Norman Rockwell's (they were contemporaries) – and decidedly rooted in the 1950's: depicting the common human condition through a lens that was largely focused on the white middle-class. While some have waved away this monochromatic view as simply a product of its era, the lack of diversity and representation in medical illustrations by Netter and others has appropriately gained increased attention.

This is especially important because of the crucial role that medical illustration continues to play in medicine. If the goal of an illustration was merely to provide a faithful representation of anatomy and disease, it would have been supplanted long ago by high-definition photography and videography. But scientific illustration is about communication: using a single, judiciously crafted picture where a thousand words would have been needed, the medical illustrator is there to inform and to teach.

While the artistry of a beautiful medical illustration is what is often most immediately apparent, its didactic value ultimately trumps this factor. Meeting the viewer halfway, while counting on his or her intuitive knowledge of visual language, the illustrator explains a complex operation or a disease process through a clear, well-constructed narrative. And, because the medical illustrator "speaks" directly to the viewer, the viewer must feel "seen." There has been a lot of emphasis on diversifying the profession, so that patients can relate to healthcare providers "who look like them" (Moore 2022). As medical illustration is a critical tool for both medical education and patient information, this diversity also needs to be applied to the representation of patients (Massie 2019, Tsanni 2023). Diversity in medical illustration can even be "good for your health." For years, dermatology textbooks represented various conditions as they appear on light skin. Many cutaneous lesions, however, including melanoma and other skin cancers, exhibit different features in darker skin tones (Bellicoso 2021, Dekkers 2023, Ilic 2022). Training physicians to diagnose dermatological conditions in all patients is obviously very important.

Fortunately, there is momentum building around the need for greater representation in medical illustration and its potential to reduce health disparities. For example, the recent launch of "Illustrating Change" aims to provide greater access to inclusive medical illustrations, while also addressing one of the root causes – the lack of diversity among medical illustrators (IllustrateChange 2024). In partnership with Deloitte and Johnson & Johnson, the Association of Medical Illustrators (AMI) has recently launched the AMI Diversity Fellowship, which supports the training and education of medical artists to create illustrations featuring patients of color (AMI 2024). This new digital library will be made available for use by medical educators to train the next generation of healthcare professionals.

And, in a poetic footnote, one of the medical schools that is helping to foster this effort toward greater representation is the Frank H. Netter, MD School of Medicine at Quinnipiac University. As part of its 10th anniversary celebration, the school partnered with the AMI to host a juried art exhibit of contemporary medical illustrations that highlighted diversity and inclusivity (**Figure 3**).

Dr. Netter's mission, in his own words, was "to depict living patients whenever possible," as a reminder to physicians that they are "treating whole human beings." His humanistic approach to medical illustration fulfilled this mission. The new movement underway toward greater representation in medical illustration builds upon his notion of depicting whole individual human beings by being inclusive of the entire range of humankind, including its broad range of skin tones and other diverse features. Today, we recognize how a lack of representation and disenfranchisement in medical illustration can lead to health disparities. If medical illustration is the face of medicine, it needs to reflect a community's broad diversity and speak to all segments of the population. A more inclusive approach to medical illustration, and visual communication in general, sensitizes healthcare providers as well, by promoting empathy, cultural humility, and humanism – all qualities that make for better doctors.

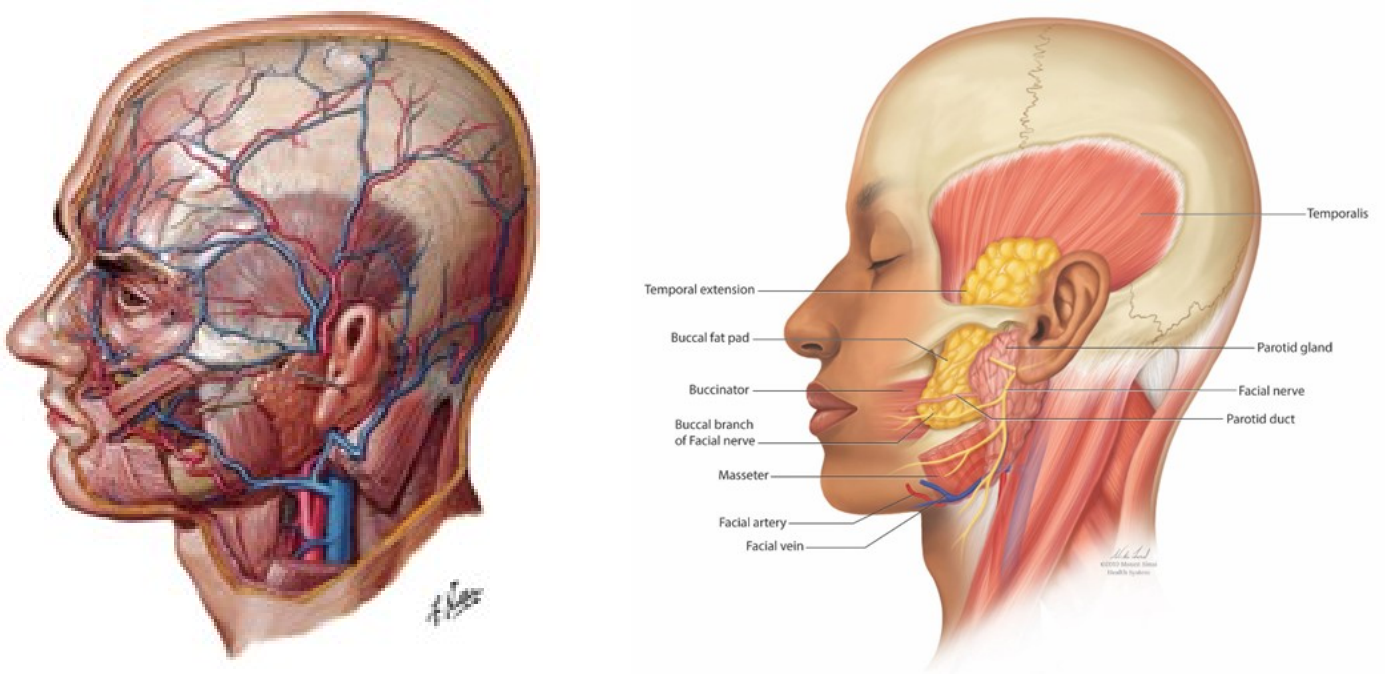

Figure 3. Netter's iconic – and Caucasian – illustration of facial anatomy (left), revisited by Ni-Ka Ford, as submitted to the 10th Anniversary of Frank H. Netter, MD School of Medicine's art exhibit (right). Left: Copyright Elsevier, used by permission. Right: Ni-Ka Ford, CMI, and Mount Sinai Health System, used by permission.

References

Association of Medical Illustrators (AMI)'s Diversity Fellowship (https://ami.org/professional-resources/diversity-fellowship). Last accessed 3/13/2024.

Bellicoso E, Quick S. O., Ayoo K. O., Beach R. A., Joseph M., and Dahlke E. 2021. Diversity in Dermatology? An Assessment of Undergraduate Medical Education. *J Cutan Med Surg* .25:409-417.

Bogen J. E. 2006. A Half-Century of Perpetuating Netter's Anatomic Error, *Journal of the History of the Neurosciences.* 15:1, 53-55.

Dekkers L. M. B., Isik U., Sanders C. J. G., and Dilaver G. 2023. Donkere huid zelden afgebeeld in Nederlandse dermatologieboeken [Deeper skin tones rarely depicted in Dutch dermatology textbooks]. *Ned Tijdschr Geneesk.* 167:D7332.

Ilic N., Prescott A., Erolin C., and Peter M. 2022. Representation in medical illustration: the impact of model bias in a dermatology pilot study. *J Vis Commun Med*. 45:253-262.

"Illustrate Change" (www.illustrateChange.com), an on-line library showcasing medical illustrations of racial and ethnic diversity. Last accessed 3/13/2024.

King J. C., Nixon P. G. 1995. Effects of non-right-handedness on risk for sudden death associated with coronary artery disease. *Am J Cardiol.* 75:1187.

Massie J. P., Cho D. Y., Kneib C. J., Burns J. R., Crowe C. S., Lane M., Shakir A., Sobol D. L., Sabin J., Sousa J. D., Rodriguez E. D., Satterwhite T., and Morrison S. D. 2019. Patient Representation in Medical Literature: Are We Appropriately Depicting Diversity? *Plast Reconstr Surg Glob Open*. 7:e2563.

Moore C., Coates E., Watson A., de Heer R., McLeod A., and Prudhomme A. 2022. "It's Important to Work with People that Look Like Me": Black Patients' Preferences for Patient-Provider Race Concordance. *J Racial Ethn Health Disparities* 10:2552-2564.

Netter F. M. 2013. Medicine's Michelangelo: The life & art of Frank H. Netter, MD. Hamden, CT, Quinnipiac University Press.

Tsanni A. 2023. How I fused passions for art and medicine into a medical illustration career. *Nature.* Apr 27.

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