

**Study Guide #12, 11/29-12/01:
Medical Technologies**

- Carhart, J.W. "The Clinical Thermometer." *Medical and Surgical Reporter* 72 (1895): 119-121.
- Herrick, James B. "Modern Diagnosis." *Journal of American Medical Association* 92 (February 1929): 518-522.
- Evans, Hughes. "Losing Touch: The Controversy over the Introduction of Blood Pressure Instruments into Medicine." *Technology and Culture* 34 (October 1993): 784-807.
- Greene, Jeremy. "Releasing the Flood Waters: Diuril and the Transformation of Hypertension." *Bulletin of the History of Medicine* 79 (Winter 2005): forthcoming.
- Beecher, Henry K. "The Powerful Placebo." *JAMA* 159 (24 December 1955): 1602-1606.

In the week before Thanksgiving, we began to look at a series of transformations in late 19th century medicine. The development of anesthesia and sterile technique transformed surgery. The development of bacteriology and Koch's postulates contributed to changes in medical theory and public health practice. Both had major changes on medical institutions. Bacteriology, for instance, accelerated the spread of laboratory training in medical schools and required hospitals to open microbiology labs. The improving status of surgery improved the status of hospitals. Both of these changes involved medical technologies. The readings this week look at a series of medical technologies in more detail. Remember what medicine would have been like in 1830: doctors and midwives had booming medical practices, using nothing more than their knowledge, experience, and senses. None would have used stethoscopes, thermometers, blood pressure cuffs, x-rays, blood tests, or any of the many things we take for granted as part of medical practice. By 1930 this had changed completely.

The readings this week will describe some of the changes, why they became influential, and different ways in which medicine (and disease) were transformed. The first two (Carhart and Herrick, both quite short) are primary sources that reveal doctors' ambivalence about new technologies in the late 19th and early 20th centuries. The second two (Evans and Greene) are both secondary sources (written by historians, who also happen to be physicians) that trace how two technologies (blood pressure cuffs and blood pressure medications) both created and transformed the disease of hypertension. The last article (Beecher) examines the puzzling technology of placebos.

Carhart, "The Clinical Thermometer": J.W. Carhart was a doctor who practiced in Texas in the late 19th century. His discussion of the risks and benefits of thermometers clearly reveals doctors' ambivalence about new technologies that we now take for granted. He was enthusiastic about the recent developments in scientific medicine. What benefits were provided by the new technologies? But he also had many concerns. What would be lost by simply relying on the number measured by a thermometer? How did Carhart think thermometers could be integrated into wise and careful clinical practice? Why do you think thermometers generated such controversy?

Herrick, "Modern Diagnosis": James Herrick (1861-1954) was one of the founders of cardiology (as a specialty) in the United States. He is most famous for a 1912 article that described heart attacks and their cause (obstructed coronary arteries). By the time "Modern Diagnosis" was written, he was one of the most famous doctors in the United States. Writing thirty years after Carhart, Herrick knew that technology had become a central part of medical practice, but he was not enthusiastic about its impact. What problems had technology created? Why did he complain about an "appalling number of facts"? Why did new technology lead to specialists? Did Herrick (himself a specialist) think that specialists provided more risks or benefits? Could technology be integrated into medicine without destroying doctors' clinical skills? Carhart and Herrick both demonstrate a generation gap in medicine between older doctors who trained before the new technologies and younger doctors who trained after them. Are you sympathetic with their concerns?

Evans, "Losing Touch": Hughes Evans is an MD-PhD who practices pediatrics and teaches history of medicine at the University of Alabama. This article examines the history of the sphygmomanometer (blood pressure cuff). How was the new technology developed? Why was it not widely accepted in medicine? Pay attention to both sides of the debates. What were the supposed benefits and costs of this new technology? Were reluctant doctors simply being old-fashioned, or did they have good reasons for being skeptical? How did both medicine and the technology have to change before sphygmomanometers could be accepted? You have all had your blood pressure measured many times. How does this ritual affect your experience of medicine?

Greene, "Releasing the Flood Waters": Jeremy Greene, another MD-PhD, is now an intern in medicine at the Brigham and Women's Hospital. This article (which has not yet been published) traces the history of hydrochlorothiazide (Diuril®), the first successful medication for high blood pressure, which works by increasing urination to rid the body of excess fluid (a model that humoral physicians would recognize). There are many interesting pieces to this (long) article. First, how and why did Merck come to recognize that marketing was as

important as R&D? Second, how was Diuril discovered? Third, how did Merck market Diuril to treat a disease that physicians had not previously worried about (asymptomatic high blood pressure)? The most interesting parts are pp. 788-794, about how the drug changed the disease. How did Merck convince doctors to treat a disease that had no symptoms? How did Diuril change the course of the disease? Can a new drug actually create a new disease?

Beecher, "The Powerful Placebo": Henry Beecher (1904-1976), anesthetist-in-chief at MGH from 1936 to 1969, led influential research on a range of topics, from respiratory physiology to surgical mortality rates, improving the safety of anesthesia, the ethics of human subjects research, defining brain death, and, as seen in this article, placebo effects. He became interested in placebo effects while working as a combat surgeon during World War II: he saw many patients who reported no pain despite horrific wounds. Psychological processes could clearly alter the perception of pain. As Beecher shows, placebo effects are one of the most puzzling aspects of medical technology. He uses a strict definition of placebo: an inert substance given by a doctor who knows it is inert, to a patient who thinks it is active. He does not discuss the ethics of using them (e.g. of using placebos in post-operative patients with wound pain). Instead, he focuses on the fact that placebos work in 35.2% of patients, for a wide range of diseases. He also describes how placebos can have physiological effects (changes in gastric acid secretion, constriction of pupils). What are the implications of all of this? How does it change the interpretation of claims of drug efficacy? How should it affect the design of clinical research?