Introduction: Cancer Control and Prevention in the Twentieth Century

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At first sight the development of cancer control programs in Europe and in North America might seem to follow similar trajectories: on both continents they emerged in the late nineteenth and early twentieth centuries, and "early detection and treatment" were generally the cornerstone of policy.[1] From this perspective, control was most likely to succeed if

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1. On cancer control in the United States, see Lester Breslow, Daniel Wilner, Larry Agran, et al., *A History of Cancer Control in the United States, with Emphasis on the Period 1946–1971*, 4 vols., prepared by the History of Cancer Control Project, UCLA School of Public Health, pursuant to Contract no. N01-CN-55172 (Bethesda, Md.: Division of Cancer Control and Rehabilitation, National Cancer Institute, Bethesda; Dept. of Health, Education, and Welfare, Public Health Service, National Institutes of Health, National Cancer Institute, Division of Cancer Control and Rehabilitation, 1977); James T. Patterson, *The Dread Disease: Cancer and Modern American Culture* (Cambridge: Harvard University Press, 1987); Barron H. Lerner, *The Breast Cancer Wars: Fear, Hope and the Pursuit of a Cure in Twentieth-Century America* (New York: Oxford University Press, 2003); Kirsten E. Gardner, *Early Detection: Women, Cancer, and Awareness Campaigns in the Twentieth-Century United States* (Chapel Hill: University of North Carolina Press, 2006). On France, Germany, and Canada, see Patrice Pinell, *The Fight against Cancer: France 1890–1940* (London: Routledge, 2002); Robert N. Proctor, *The*

medical interventions began as early as possible in the development of the disease—or of a precursor to the disease—when, doctors[2] believed, the chance of successful treatment was greatest. Thus the key tasks of control programs were to identify the disease or the risk of the disease at the earliest possible stage; to get patients to their doctors as soon as the disease, or the possibility of disease, was identified; and to ensure their early treatment by experts using a recognized means of treatment—generally surgery, radiotherapy, chemotherapy, or some combination thereof.

The term "control" was carefully chosen. Until recently programs did not emphasize the elimination or eradication of the disease, nor of the suffering and death it caused, at least in the short term.[3] For most of the century, when mortality seemed to rise relentlessly, the assumption was that the disease and the risk of the disease would not go away, at least in the foreseeable future. Individual patients might be cured, but there was always the chance of recurrence. Mortality and incidence might eventually decline, but the disease or the risk of the disease would always be present in the population. It would always be in need of management or control. Thus, despite various "wars," "campaigns," and "crusades" to "conquer" the disease, the best that anticancer programs generally offered was the possibility of effective intervention if a cancer—or a precancerous condition—established itself in the body and was discovered early. To this end, they sought not only to control the disease therapeutically, but also to reform the behaviors, individuals, organizations, and social structures that encouraged delay.[4]

One of the standard stories goes that—with perhaps the exception of Nazi Germany[5]—"early detection and treatment" dominated control programs until the 1960s and 1970s, when they were challenged by a growing interest in cancer prevention.[6] In this account, attention broadened from

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Nazi War on Cancer (Princeton: Princeton University Press, 1999); Charles Hayter, *Element of Hope: Radium and the Response to Cancer in Canada, 1900–1940* (Montreal: McGill-Queen's University Press, 2005).

2. The term "physician" has different meanings in Britain and the United States. In this essay I reserve the term for discussions of doctors in the United States. When discussing other countries or international events that include the United States, I use the terms "doctors," "medical practitioners," or "practitioners."

3. Andrew C. von Eschenbach, "NCI Sets Goal of Eliminating Suffering and Death Due to Cancer by 2015," *J. Nat. Med. Assoc.*, 2003, *95*: 637–39; "NCI Director Sets a Goal: Eliminate Suffering, Death from Cancer by 2015," *Cancer Lett.*, 2003, *29* (7): 1–7.

4. Robert A. Aronowitz, "Do Not Delay: Breast Cancer and Time, 1900–1970," *Milbank Quart.*, 2001, *79*: 355–86.

5. Proctor, *Nazi War on Cancer* (n. 1).

6. Breslow et al., *History of Cancer Control* (n. 1); Robert N. Proctor, *Cancer Wars: How Politics Shapes What We Know and Don't Know about Cancer* (New York: Basic Books, 1995).

the treatment of cancers at an early stage in their development to include the prevention of the disease before it started. The roots of this interest in cancer prevention are usually traced to Anglo-American work in the 1940s that identified smoking as a cause of cancer, which by the 1960s and 1970s widened to a range of other putative causes of cancer associated with occupation, environment, and lifestyle. The story traces the difficult birth of cancer prevention during this period, and of attempts by the state to identify and regulate carcinogenic substances.

The papers in this collection suggest that such a tale will have to be revised. Focusing primarily on Britain and the United States, the authors tell stories not of similar trajectories, but of a diversity of approaches to and meanings of *control*. In the first place, they suggest that the first phase—early detection and treatment—was characterized by many different approaches, including public education and the organization of cancer therapy. In Britain and America cancer agencies agreed that it was essential that people should seek medical attention as early as possible. They also agreed that expert surgery, radiotherapy, and chemotherapy were the only effective treatments. But they differed over how to get the public to go to the doctor, the role of public education, how cancer services should be delivered, who should provide them, and what forms of therapy were most appropriate to particular cancers.

In the second place, these papers also highlight a diversity of approaches to *prevention* in the twentieth century.[7] The standard account is a tale of the difficult birth of efforts to prevent cancer from the late 1960s and 1970s.[8] Papers in this collection lend support to this account; however, they also suggest that prevention meant much more than preventing environmental and lifestyle causes of cancer. They demonstrate that throughout the twentieth century "early detection and treatment" were themselves sometimes portrayed as a form of cancer prevention—preventing the further development of cancers already established in the body, or identifying and intervening against precancerous conditions before they turned cancerous. The difficult birth of the 1960s and 1970s was thus in part the result of struggles between therapeutic models of prevention and those based on targeting environmental and lifestyle causes of the disease. This struggle

7. I am particularly grateful to Ornella Moscucci for discussions about cancer prevention in the United Kingdom. She is working on a history of cancer prevention, and has independently come to a similar argument to the one presented here: Ornella Moscucci, "Preventing Cancer: Problems of Aetiology and Strategy in Early Twentieth Century United Kingdom" (Paper presented to the History of Cancer Conference held at Moulin XII, Ste Gemme Moronval, France, 18–20 October 2006).

8. Breslow et al., *History of Cancer Control* (n. 1); Proctor, *Cancer Wars* (n. 6).

was further complicated by tensions between those who focused prevention on efforts to reform individual behavior and those who focused on social-structural determinants of health and disease.

In what follows, I adopt a capacious definition of cancer control. Control has historically covered much more than scientific and medical efforts to control the disease as a biological entity, or to control cancer mortality and incidence: it has also involved efforts to control or manage human activities, structures, and emotions that affected these goals, including those that promoted delay or increased the risk of the disease. It has thus covered a very wide range of activities, undertaken by a very wide range of groups, that cover much of the field of cancer in the twentieth century. Contemporary commentators have attempted to narrow the definition of control: to demarcate it from prevention, biomedical research, and routine medical care; to separate it from the politics of cancer; and to divide the world of cancer into those who promote or impede the advance of control.[9] Such a narrowing may capture something of the drift of current Anglo-American approaches to control, but it does not capture the rich diversity of this subject in the twentieth century that this volume seeks to explore, nor does it capture how efforts to control the disease were embedded in a range of other related activities aimed at controlling social, economic, and cultural activities related to cancer.

Detection and Treatment, 1900–1970

American cancer-control programs provide a valuable starting point for an exploration of the first theme—the diversity of national approaches to "early detection and treatment." There is a substantial literature on the campaigns against cancer in the United States,[10] perhaps more than for

9. Breslow et al., *History of Cancer Control* (n. 1), esp. vol. 1, *Introductory Materials*, pp. 14–16; Proctor, *Cancer Wars* (n. 6); *A New Agenda for Cancer Control Research: Report of the Cancer Control Review Group*, National Cancer Institute, Cancer Control Program Review Group, 7 August 1997, NCI archives, Bethesda, Md., DC012878. An online version of the report is available at **http://deainfo.nci.nih.gov/ADVISORY/BSA/bsa_program/bsacacntrlmin.htm** (accessed 10 July 2006). The separation between prevention and control was implicit in the title of the National Cancer Institute's Division of Cancer Prevention and Control (DCPC), created in 1983. In 1997 the distinction widened when the NCI abolished the DCPC and created two new divisions: the Division of Cancer Control and Population Science under Barbara Rimer, and the Division of Cancer Prevention under Peter Greenwald: "DRCCA Will Become DCPC, Organize into Three Major Program Areas," *Cancer Lett.*, 1982, *8* (33): 4–6; "NCI Splits Prevention and Control Division; Rimer to Direct Division of Cancer Control," ibid., 1997, *23* (29): 1–5.

10. Breslow et al., *History of Cancer Control* (n. 1); Patterson, *Dread Disease* (n. 1); Lerner, *Breast Cancer Wars* (n. 1); Gardner, *Early Detection* (n. 1).

other countries. As the papers collected here show, the American story differs substantially from that of Britain and other countries.

The United States

Early detection and treatment dominated American approaches to cancer, and in particular the policies of the American Society for the Control of Cancer (ASCC). Founded in 1913 by a small group of surgeons who saw early surgical—and later radiotherapeutic—intervention as the key to cancer control, the ASCC came to dominate American approaches to cancer control in the first half of the century. The problem, the ASCC claimed, was that patients often arrived in the doctor's office long after the possibility of cure had gone.[11] Part of the reason was that the beginnings of the disease could be subtle, painless, and easily missed. There was often little to prompt the would-be patient to see his or her physician. All too often, the ASCC complained, the public was quite unaware of the nature of the warning signs of cancer, doubtful of the possibility of a cure, and overly fearful of the disease or its treatments, and so avoided the physician until pain and debility became too much—and by then it was often too late: the disease had progressed too far for successful treatment. Furthermore, "quacks" and ignorant orthodox physicians often compounded the issue by confusing the public, mistreating the disease, and encouraging further delay.

The ASCC's diagnosis of the cancer problem was shared by most other cancer organizations in the United States, including state health authorities (which became increasingly concerned about cancer from the late 1920s) and the federal government (which established a National Cancer Institute in 1937). To all these agencies, education was a key to transforming such attitudes. From the 1910s, vast public-education programs aggressively promoted early detection and treatment as creating the best opportunity for a cure; encouraged people to inspect themselves for the early warning signs of cancer[12] and to undergo regular medical checkups; warned of the dangers of quackery and folk remedies;[13] and sought to undermine popular beliefs that might encourage delay. The message was that cancer was curable if caught early and treated by a recognized

11. Aronowitz, "Do Not Delay" (n. 4).

12. On efforts to promote breast self-examination in the 1950s, see, e.g., Lerner, *Breast Cancer Wars* (n. 1), pp. 54–60.

13. For a different approach to alternative medicine, see the account of Canadian responses to alternative medicine in Barbara Clow, *Negotiating Disease: Power and Cancer Care, 1900–1950* (Montreal: McGill-Queens University Press, 2001), esp. pp. 119–46.

physician, and the public was thus urged to turn to their physicians at the first suspicion of cancer—though cancer educators often sent different messages to men and women, some of which tended to undermine their own stated goals.[14] Public-education programs were complemented by medical-education programs that targeted ignorant physicians, who, the organizers of cancer campaigns feared, might undermine the control efforts. They also dovetailed with efforts to raise support for cancer organizations: public education often blurred seamlessly into fund-raising and political lobbying, thus laying the groundwork for the dramatic expansion of philanthropic and government support for cancer after World War II.

If cancer agencies sought to transform people's attitudes and behaviors toward the disease and its treatments, they also sought to reorganize cancer services.[15] In general, within each state they hoped to create a hierarchical network of care, beginning with the family physician (the port-of-first-call for many middle-class patients until the breakdown of family medicine in the 1960s), followed variously by local cancer clinics, regional cancer hospitals or centers, and, for some, a national cancer hospital. This hierarchy would be linked by a referral system that aimed to channel cancer patients into a few specialist centers, to tempt them away from domestic and alternative remedies, and to limit the role of family physicians in treating cancer. In the specialist centers they could be treated by teams of experts in the disease (supported by laboratory and technical services) who would also hone their skills on the large numbers of patients coming through, and would use such patients as a means of educating future generations of physicians.

In practice, the situation varied from state to state and from institution to institution. There were vast differences in provision according to geography and the economic class and race of patients. The market-driven nature of medical practice often resulted in a patchwork of provision, dependent on the ability of individual physicians to raise funds to purchase radium or other therapeutic technologies, on the perception of new therapeutic technologies as money-spinners for hospitals, or on the internecine struggles between practitioners of surgery and radiotherapy (and later, chemotherapy). It also created problems for efforts to rationalize cancer services. For many physicians, the creation of centralized

14. Leslie J. Reagan, "Engendering the Dread Disease: Women, Men, and Cancer," *Amer. J. Pub. Health*, 1997, *87*: 1779–87.

15. The model of cancer services described here is similar to Daniel M. Fox's model of hierarchical regionalism: see Fox, *Health Policies, Health Politics: The British and American Experience, 1911–1965* (Princeton: Princeton University Press, 1986).

referral systems and teamwork posed a challenge to individual private practice, especially where state or federal authorities were involved. And the problem was further complicated by disagreements among cancer experts on how control should be organized: some recommended the creation of cancer institutes, others wanted cancer clinics in existing hospitals, and others argued for combinations such as central units with satellite clinics.[16] Yet despite these differences and problems, the fantasy of a rational organization of cancer services persisted.

Reorganization extended not only to the provision of services, but also to the production of knowledge. In the mid-twentieth century, support for cancer research increased dramatically, both from the federal government and from voluntary agencies such as the ASCC.[17] Much of this research explored basic questions of the biological cause and mechanism of action of cancer, leading to fears of a divorce between research and control.[18] Programs of cancer control within the federally funded National Cancer Institute (NCI) became increasingly marginalized

16. See, e.g., the results of a Canadian survey of American opinion on cancer-control organization: Hayter, *Element of Hope* (n. 1), p. 117.

17. For earlier efforts at promoting research, see Victor A. Triolo and Ilse L. Riegel, "The American Association for Cancer Research, 1907–1940: Historical Review," *Cancer Res.*, 1961, *21*: 137–67; Hugh J. Creech, "Historical Review of the American Association of Cancer Research, Inc., 1941–1978," ibid., 1979, *39*: 1863–90; Karen A. Rader, *Making Mice: Standardizing Animals for American Biomedical Research, 1900–1955* (Princeton: Princeton University Press, 2004).

18. For example, American public-education programs informed the public that cancer was not a hereditary disease, at the same time that research organizations supported vast programs of experimental research into cancer genetics and heredity. See David Cantor, "The Frustrations of Families: Henry Lynch, Heredity and Cancer Control, 1962–1975," *Med. Hist.*, 2006, *50*: 279–302; on cancer genetic research see Ilana Löwy and Jean-Paul Gaudillière, "Disciplining Cancer: Mice and the Practice of Genetic Purity," in *The Invisible Industrialist: Manufactures and the Production of Scientific Knowledge*, ed. Jean-Paul Gaudillière and Ilana Löwy (Basingstoke: Macmillan, 1998), pp. 209–49; Jean-Paul Gaudillière, "Circulating Mice and Viruses: The Jackson Memorial Laboratory, the National Cancer Institute, and the Genetics of Breast Cancer, 1930–1965," in *The Practices of Human Genetics*, ed. Michael Fortun and Everett Mendelsohn (Dordrecht: Kluwer Academic, 1999), pp. 89–124; Gaudillière, "Mendelism and Medicine: Controlling Human Inheritance in Local Contexts, 1920–1960," *Comptes rendus de l'Académie des Sciences*, ser. 3, *Sciences de la vie*, 2000, *323*: 1117–26; Gaudillière, "Making Heredity in Mice and Men: The Production and Uses of Animal Models in Postwar Human Genetics," in *Heredity and Infection: The History of Disease Transmission*, ed. Gaudillière and Ilana Löwy (London: Routledge, 2001), pp. 181–202; Gaudillière, "Mapping as Technology: Genes, Mutant Mice, and Biomedical Research (1910–1965)," in *Classical Genetic Research and Its Legacy: The Mapping Cultures of Twentieth-Century Genetics*, ed. Hans-Jörg Rheinberger and Gaudillière (London: Routledge, 2004), pp. 173–203; Rader, *Making Mice* (n. 17).

institutionally in the 1940s.[19] The American Society for the Control of Cancer dropped the word "control" from its title in 1944 and became the American Cancer Society (ACS). Critics increasingly argued that the research had less to do with control than with the research agendas and careers of the scientists.[20] Nevertheless, research also identified trends in incidence, mortality, and survival, and aimed to develop new diagnostic and therapeutic interventions, including drug treatments for cancer such as chemotherapy and immunotherapy.[21] For example, from the 1940s vast programs of research aimed to identify new chemical compounds that might work against the disease, and to test the therapeutic value of these compounds.[22] Ideally, promising new compounds would be tested on animal models and through clinical trials on patients, especially the randomized double-blind clinical trial. The specialist hospitals and centers established to provide cancer care became centers of such research, since their large populations of patients and teams of experts made them ideal settings for therapeutic trials.

Thus, until the 1970s, American cancer-control programs had several objectives: they aimed to encourage the public to seek care at the earliest opportunity from competent orthodox physicians; to educate regular physicians to deal more effectively with the disease; to establish systems for channeling patients to appropriate specialist care; and, especially from the 1940s and 1950s, to improve knowledge and practice through research. These objectives were supported by legal restrictions on who could treat cancer, and on access to potentially harmful therapeutic technologies and substances, both orthodox and alternative. They were also supported by vast lobbying and marketing efforts promoted by the voluntary and federal cancer agencies, professional organizations, and, increasingly, corporations with interests in producing and distributing cancer products and services.

19. Breslow et al., *History of Cancer Control* (n. 1). On the importance of radium therapy to the NCI in the 1930s, see David Cantor, "Radium, Cancer Research, and the End of the New Deal" (paper presented at the "Biomedicine in the Twentieth Century: Practices, Policies, and Politics" conference held at the National Institutes of Health, Bethesda, Md., 5–6 December 2005).

20. Daniel S. Greenberg, *The Politics of Pure Science* (New York: New American Library, 1968).

21. Toine Pieters, *Interferon: The Science and Selling of a Miracle Drug* (London: Routledge, 2005); Sandra Panem, *The Interferon Crusade* (Washington, D.C.: Brookings Institution, 1984). See also Ilana Löwy, *Between Bench and Bedside: Science, Healing, and Interleukin-2 in a Cancer Ward* (Cambridge: Harvard University Press, 1996).

22. Jordan Goodman and Vivien Walsh, *The Story of Taxol: Nature and Politics in the Pursuit of an Anti-Cancer Drug* (Cambridge: Cambridge University Press, 2001).

Public Education

But what was characteristic of American cancer control was not necessarily characteristic of programs elsewhere. In the United States, vast programs of public education were instituted in the early twentieth century[23]—but elsewhere, others were more cautious about this approach. In the Netherlands, for example, public-education programs did not emerge until the 1950s, despite the beginnings of national efforts against cancer in the 1910s.[24] In this volume, Elizabeth Toon suggests that the British (who also began anticancer efforts in the early twentieth century) were similarly reluctant to promote public education until the 1950s and 1960s.[25]

Such differences reflected, in part, very different attitudes toward managing the public. Critics worried that American-style efforts to promote self-examination might encourage the public to self-diagnose the disease, and so ultimately to undermine programs of cancer control by challenging the authority of the doctor.[26] They also worried that such public-education efforts might blind the public to any educational message by inducing either a paralyzing fear of the disease, or an undue optimism about the possibility of a cure that would eventually be disappointed as the expected cure failed to materialize.[27] Such concerns led British and Dutch cancer agencies to adopt a much more cautious, paternalistic attitude toward public education, as did related fears that such programs might overwhelm general practitioners with trivial complaints from their patients, or undermine efforts to persuade the public to support cancer research or treatment. Educational efforts in these countries tended to focus less on the public than on the profession, and, where they did focus on the public, they tended to stress local (and often low-key) rather than

23. Similar programs were also instituted in France, Germany, and Canada, emphasizing early detection and treatment. See Pinell, *Fight against Cancer* (n. 1); Proctor, *Nazi War on Cancer* (n. 1); Hayter, *Element of Hope* (n. 1).

24. Stephen Snelders, Frans J. Meijman, and Toine Pieters, "Cancer Health Communication in the Netherlands 1910–1950: Paternalism or Popularization?" *Medizinhistorisches Journal*, 2006, *41*: 271–89.

25. See also Ornella Moscucci, "Fast Track to Treatment: Cancer Education in Britain, ca. 1900–1948" (paper presented at the "Patients and Pathways: Cancer Therapies in Historical and Sociological Perspective" conference held at the Centre for the History of Science, Technology and Medicine, University of Manchester, 6–8 October 2005).

26. Snelders, Meijman, and Pieters, "Cancer Health Communication" (n. 24); Moscucci, "Fast Track to Treatment" (n. 25).

27. On British medical attitudes toward public emotion, see David Cantor, "Representing 'The Public': Medicine, Charity and Emotion in Twentieth-Century Britain," in *Medicine, Health and the Public Sphere in Britain, 1600–2000*, ed. Steve Sturdy (London: Routledge, 2002), pp. 145–68.

national efforts. There was no equivalent to the ASCC in Britain; the two major cancer charities—the British Empire Cancer Campaign and the Imperial Cancer Research Fund—were more focused on research than was their American counterpart.[28]

None of this is to say that the Americans were not similarly concerned that educational programs might work against the objectives they were supposed to promote.[29] On the contrary, American cancer campaigns recognized that even the most careful public-education program might encourage people to delay. The point is illustrated by my paper in this volume on public-education movies, in which I argue that American cancer agencies tended to worry that these movies might undermine the very message they wished to get across by promoting undue fears or hopes in the public. But whereas such concerns prompted the British and Dutch to eschew public-education efforts, the Americans took a very different approach: they sought to embed the movies within a range of other educational efforts in order to counteract any tendency on the part of the public to misread the message. They also used the new technology to educate the public to manage their own fears of the disease, and they excluded from movies subjects (such as radical surgery) that they feared might deter would-be patients from seeking care from regular physicians. Gretchen Krueger's paper on public campaigns against childhood leukemia reinforces the last point: she shows that cancer agencies drew on older images of the child to promote their messages and agendas to the public, but that they also tended to underplay aspects of the disease and its treatment that they feared might work against their messages and agendas. The cancer organizations discussed in both of these papers saw the public as a fickle entity that needed to be managed both for its own benefit and for that of the organizations. It was such an approach to the public that helped to generate the vast expansion of political, philanthropic, and popular support for cancer after World War II. By embedding mass-media approaches to cancer education within broader communication systems that also emphasized the importance of personal communication between doctor and patient, the American cancer agencies were able to undertake aggressive, even sensationalist, public-education campaigns while, at the same time, counteracting any possibility that these campaigns might undermine the message of control.

28. Joan Austoker, *A History of the Imperial Cancer Research Fund, 1902–1986* (Oxford: Oxford University Press, 1988).

29. For a comparison of British and American responses to cancerphobia, see James T. Patterson, "Cancer, Cancerphobia, and Culture: Reflections on Attitudes in the United States and Great Britain," *Twent. Cent. Brit. Hist.*, 1991, *2*: 137–49.

If the papers in this collection highlight the very different attitudes of the British and the Americans toward public education before the 1950s, they also show how, from the 1950s, the British sought to give up their earlier doubts about public education. Toon highlights the importance to this change of a survey conducted in the Northern English city of Manchester, which began to transform the image of the British general public. This survey suggested that some doctors no longer saw the British public as ignorant of the disease: in their view, it was in fact quite knowledgeable of the disease, albeit not in the way that doctors and scientists were. The public's knowledge came from local, everyday encounters with medicine and medical institutions. From this perspective, it was suggested that British control efforts should focus on changing people's experience of cancer. Put another way, the belief was that people would seek cancer care if cancer services improved—a problematic assumption, given the shortfalls in medical ability to tackle the disease, and political anxieties that the demand for health care risked creating an unmanageable tax burden. Perhaps for such reasons, the Manchester "experiment" had only a limited immediate impact: cancer education remained a low priority for the British until the 1960s. As Virginia Berridge notes in this volume, it was not until after the Royal College of Physicians 1962 report on the link between smoking and cancer that the British began to focus more attention on broader educational programs, and to use the media to get the message across.[30]

Therapy

The papers in this collection also illustrate how British approaches to cancer therapy differed from those in the United States. It has been noted that until the 1970s, orthodox practitioners in both countries tended to regard surgery, X rays, radium, and (from the 1940s) chemotherapy as the mainstays of therapy—but British and American practitioners differed over what forms of therapy were appropriate to particular cancers, how services should be organized, and who should provide them. John Pickstone highlights the point in his article in this volume. He sees the history of cancer therapy in the twentieth century as a successive addition of modalities: surgery, radiotherapy, and chemotherapy layered on one another, so that by the end of the century cancers would often be treated with combinations of these modalities that varied depending on

30. See also Virginia Berridge and Kelly Loughlin, "Smoking and the New Health Education in Britain, 1950s–1970s," *Amer. J. Pub. Health*, 2005, *95*: 956–64.

the type of cancer, its location, its stage of development, and the effectiveness of other interventions. He argues that historians have yet to engage with this kind of "contested cumulation" of therapies, but he also stresses that these additions were negotiated in different ways in Britain and the United States, with different long-term consequences for the development of services and specialization. In each country negotiations were framed by the specific political, economic, social, and health-care structures in which they developed. In Britain, health-care organization tended to be centralized and tax-funded; in America, it tended to be individualized and market-funded.

Radium provides a good illustration of such differences before World War II. As Pickstone and Ornella Moscucci note, radium emerged as an alternative and supplement to surgery after World War I.[31] But it was often hard to obtain, and as medical demand grew in the late 1920s, attention in Britain focused on a national shortfall in supplies. In 1929 the government, in association with voluntary organizations, established the Radium Trust and Radium Commission: the former to purchase radium with government and voluntary monies, the latter to distribute the radium to hospitals across the country.[32] During the 1930s the Radium Trust was perhaps the world's largest purchaser of radium, able to negotiate price reductions in the world's most expensive substance due to its purchasing power, and through imperial agreements after 1932 when Canadian sources of radium challenged an older Belgian dominance of supply.[33] The Commission

31. For the significance of radium to French and Canadian cancer services see, respectively, Pinell, *Fight against Cancer* (n. 1), and Hayter, *Element of Hope* (n. 1).

32. The exception was that radium in London was purchased and distributed through the King Edward's Hospital Fund. On radium therapy in Britain, see Caroline Murphy, "A History of Radiotherapy to 1950: Cancer and Radiotherapy in Britain 1850–1950" (Ph.D. diss., University of Manchester, 1986); Murphy, "From Friedenheim to Hospice: A Century of Cancer Hospitals," in *The Hospital in History*, ed. Lindsay Granshaw and Roy Porter (New York: Routledge, 1989), pp. 221–41; David Cantor, "The Definition of Radiobiology: The Medical Research Council's Support for Research into the Biological Effects of Radiation in Britain, 1919–1939" (Ph.D. diss., Lancaster University, 1987); Cantor, "The MRC's Support for Experimental Radiology during the Inter-war Years," in *Historical Perspectives on the Role of the MRC: Essays in the History of the Medical Research Council of the United Kingdom and Its Predecessor, the Medical Research Committee, 1913–1953*, ed. Joan Austoker and Linda Bryder (Oxford: Oxford University Press, 1989), pp. 181–204. For an older account of the Commission, see F. G. Spear and K. Griffiths, *The Radium Commission: A Short History of Its Origin and Work, 1929–1948* (London: His Majesty's Stationery Office, 1951). On the King's Fund, see F. K. Prochaska, *Philanthropy and the Hospitals of London: The King's Fund, 1897–1990* (Oxford: Clarendon Press, 2002), pp. 115–17, 141–42.

33. For an account of radium production and supply, see Edward R. Landa, "The First Nuclear Industry," *Sci. Amer.*, 1982, *247* (5): 180–93.

used the vast supplies provided by the Trust to reshape cancer services in the country: Hospitals that wanted Commission radium were encouraged to adopt certain standards of therapeutic practice. The Commission also enforced a closer coordination between X-ray and radium therapy, the appointment of physicists or radium officers to measure dosage and ensure radiation protection, and the creation of teams of physicists/radium officers, pathologists, surgeons, and radiotherapists to manage care. It encouraged the separation of radiotherapy from the diagnostic uses of X rays. And it was instrumental in transforming the approach of Medical Officers of Health (MOsH) toward cancer: their early interest in social, preventive, and holistic approaches had by the 1930s given way to individualized, reductive, and therapeutic approaches; they had become administrators of clinical and laboratory approaches to cancer.[34]

These efforts to reform cancer services did not go unchallenged. Local radium committees contested the Commission's authority; surgeons and radiologists were sometimes reluctant to adopt its standards; doctors worried that treatment might be determined by the accidents of referral; and (as in America) there were continual mutterings of medical discontent about the increased role of the state in medicine, and the subordination of the individual practitioner to the team. But the Commission—together with a related radium-research scheme organized by the Medical Research Council (MRC)[35]—provided an institutional framework for the development of cancer therapy in the 1930s. MRC and Commission radium was used to promote a variety of profession and political agendas, including those of radiotherapists, hospital physics, and, as Moscucci shows in this volume, feminist doctors. It was a means to improve access to beds, shape the development of therapeutic practice, and improve women's health and women's access to medical education.

The story of radium is very different in the United States. Despite similar concerns about a national shortfall of radium for cancer services, American physicians were reluctant to create a centralized purchasing and distribution system—though some states, including Missouri, came close to such a system. Some American physicians argued for the creation of a federal organization equivalent to the British Radium Trust and Commission as a solution to the shortage, but efforts in this direction were stymied by fears of growing involvement of government in cancer and

34. Rosa M. Medina-Domenech and Claudia A. Castañada, "Redefining Cancer during the Inter-War Period: British Medical Officers of Health, State Policy, Managerialism, and Public Health," *Amer. J. Pub. Health*, in press.

35. Cantor, "MRC's Support for Experimental Radiology" (n. 32).

radium. After a brief flirtation with federal purchase and distribution of medical radium, in the late 1930s physicians persuaded the government to shift its focus to improving medical training and encouraging research.[36] Thereafter the vast bulk of American medical radium was purchased by a diverse range of organizations and individuals, with the result that practice developed very differently in different parts of the country and in different institutions, and it tended to remain under the control of surgeons. There was no central agency to standardize practice, to enforce either a union between X-ray and radium therapy or their separation from the diagnostic uses of radiation (which remained closely linked to therapeutics in the United States at least until the 1960s).

Such differences are striking, given that the Americans and the British had very similar radium problems. Interwar American physicians complained that the development of radium therapy in their country was hampered by inadequate supplies of the element. In their view, therapeutics was at the mercy of the international trade in radium, much of it under the control of European imperial powers, and certain key technical developments in radium therapy (notably radium beam therapy) were difficult to develop in the United States because they required huge quantities of radium. In America most medical radium (generally, in the form of one of its salts) was used in milligram quantities contained in tubes, needles, or plaques that were implanted into or placed upon the surface of the body. Alternatively, it was used to produce radon gas, which was held in containers called "seeds" and implanted in the body in similar ways to the salt. By contrast, radium beam therapy involved the use of large quantities of radium—perhaps half a gram or more—to generate a beam of radiation at some distance from the body that was used therapeutically in a manner akin to X rays. It was becoming almost a routine treatment in Europe in the late 1930s, but it remained an experimental technique in the United States—partly because of the radium shortage, partly because many American physicians were not convinced by the European experience of beam therapy, and partly because they began to look to alternative technologies such as supervoltage X-ray machines or the cyclotron.

If Europeans dominated the new therapies of the 1920s and 1930s, the situation was very different after World War II. Against a backdrop of economic growth in the United States, American spending on cancer soared, rapidly overtaking anything in war-devastated Europe, which was struggling to recover economically. A new "biomedical complex" emerged around cancer, characterized by new relationships between the biological

36. Cantor, "Radium, Cancer Research" (n. 19).

sciences, clinical medicine, the pharmaceutical industry, and the federal government as a major supporter of research, as well as by a vast increase in the scale of investment, the numbers of research institutions, and the size of the scientific and medical communities, and all increasingly entangled in emergent Cold War politics. In other words, the postwar years saw the development of a new system of cancer research that involved new relations between medical innovation and biology.[37] This development affected Britain as well, but in different ways and to varying degrees.

For the British, the scale of American cancer research was so vast that it raised important questions about how to fit into this research world. In new areas such as chemotherapy it seemed to make little sense to compete directly with the Americans, and they therefore shifted focus to develop programs that built on British research strengths within the larger American program.[38] At the same time, they remained much less enthusiastic about chemotherapy than their American counterparts, and a clinical specialty of oncology based on chemotherapy did not emerge in the United Kingdom before the 1970s. As Pickstone and Carsten Timmermann suggest, the British continued to focus much more effort on radiotherapeutics. Yet even here Americans often dominated: major new developments in radiotherapeutic technology often came from the United States, and British and European innovations were often more effectively developed in the United States. The British repeatedly found themselves struggling to keep up with American research on a range of new therapeutic devices, including the cobalt bomb, the cyclotron, the betatron, the linear accelerator, and the nuclear pile, a source of radioisotopes.[39]

37. Jean-Paul Gaudillière, *Inventer la biomédicine: La France, l'Amérique et la production des savoirs du vivant (1945–1965)* (Paris: La Découverte, 2002). For a valuable account of cancer research and Cold War politics in the USSR, see Nikolai Krementsov, *The Cure: A Story of Cancer and Politics from the Annals of the Cold War* (Chicago: University of Chicago Press, 2002).

38. For a history of cancer research in Britain, see Austoker, *History of the Imperial Cancer Research Fund* (n. 28).

39. Angela N. H. Creager, "Tracing the Politics of Changing Postwar Research Practices: The Export of 'American' Radioisotopes to European Biologists," *Stud. Hist. & Philos. Sci.*, part C: *Biol. & Biomed. Sci.*, 2002, *33*: 367–88; Creager, "The Industrialization of Radioisotopes by the U.S. Atomic Energy Commission," in *The Science-Industry Nexus: History, Policy, Implications: Nobel Symposium 123*, ed. Karl Grandin, Nina Wormbs, and Sven Widmalm (Sagamore Beach, Mass.: Science History Publications/USA, 2004), pp. 143–67. On links between postwar nuclear physics and cancer, see Stuart M. Feffer, "Atoms, Cancer, and Politics: Supporting Atomic Science at the University of Chicago, 1944–1950," *Hist. Stud. Phys. & Biol. Sci.*, 1992, *22*: 233–61. On British medical isotopes, see Alison Kraft, "Between Medicine and Industry: Medical Physics and the Rise of the Radioisotope, 1945–65," *Contemp. Brit. Hist.*, 2006, *20*: 1–35.

The scale and nature of postwar American efforts is well illustrated by chemotherapy, which emerged in the 1940s and 1950s especially against childhood leukemia. As budgets for cancer grew, American governmental and private agencies developed vast programs on an industrial scale to identify chemicals of possible value in treatment.[40] Such programs involved the study of tens of thousands of different compounds for possible anticancer properties;[41] if any showed these properties, they would be tested on animals, and eventually on humans. Peter Keating and Alberto Cambrosio argue in this volume that a new "style of practice"—the clinical trial—emerged at this time that brought together oncologists, patients, and institutions to explore the value of these substances for the treatment of cancer, to shape research agendas, and to formalize guidelines for research and eventually routine treatment.[42] But the process was painstaking, often taking years, and only a few compounds ever made it to clinical practice. Nothing on this scale existed in Britain, or indeed anywhere else in the world. Keating and Cambrosio suggest that European clinical-trial programs in the 1960s developed in ways that were often quite different from those in the United States.[43]

None of this is to say that the British therapeutics was shaped entirely by developments in America. It has already been noted that the British were much less enthusiastic about chemotherapy than the Americans; similarly, they were much less enamored of radical surgical techniques, such as the radical mastectomy. Pickstone shows how such differences can be attributed, at least in part, to the institutional strength of radiotherapy within the newly created National Health Service (created 1948),

40. R. F. Bud, "Strategy in American Cancer Research after World War II: A Case Study," *Soc. Stud. Sci.*, 1978, *8*: 425–59; C. Gordon Zubrod, "Origins and Development of Chemotherapy Research at the National Cancer Institute," *Cancer Treat. Rep.*, 1984, *68*: 9–19.

41. Goodman and Walsh, *Story of Taxol* (n. 22).

42. Keating and Cambrosio's account is part of a broader effort to trace the contours of the cancer clinical trial. See also Peter Keating and Alberto Cambrosio, "Real Compared to What? Diagnosing Leukemias and Lymphomas," in *Living and Working with the New Medical Technologies: Intersections of Inquiry*, ed. Margaret Lock, Allan Young, and Alberto Cambrosio (Cambridge: Cambridge University Press, 2000), pp. 103–34; Keating and Cambrosio, "The New Genetics and Cancer: The Contributions of Clinical Medicine in the Era of Biomedicine," *J. Hist. Med. & Allied Sci.*, 2001, *56*: 321–52; Keating and Cambrosio, "From Screening to Clinical Research: The Cure of Leukemia and the Early Development of the Cooperative Oncology Groups, 1955–1966," *Bull. Hist. Med.*, 2002, *76*: 299–334; Keating and Cambrosio, "Beyond 'Bad News': The Diagnosis, Prognosis and Classification of Lymphomas and Lymphoma Patients in the Era of Biomedicine (1945–1995)," *Med. Hist.*, 2003, *47*: 291–312.

43. For a general history of the clinical trial in the United States, see Harry M. Marks, *The Progress of Experiment: Science and Therapeutic Reform in the United States, 1900–1990* (Cambridge: Cambridge University Press, 1997).

a legacy of the efforts by the National Radium Commission to reshape radiotherapy in the 1930s. Such institutional strength allowed radiotherapists to challenge surgeons in areas they regarded as their own. Indeed, as Barron Lerner has noted elsewhere, U.S. surgeons who doubted the value of the radical mastectomy turned for evidence to their British and European colleagues.[44] In this volume Lerner shows how American critics of chemotherapy also looked to Europe and Canada. Thus a comparative focus on British and American cancer therapy allows us to explore what was specifically British or American about that therapy, and how the two traditions shaped each other.

Prevention

The second major focus of this collection is on the diversity of approaches to and meanings of prevention in the twentieth century. A standard story is of the marginalization of prevention within programs of cancer control in the first fifty to sixty years of the century, followed by its difficult birth in the 1960s and 1970s. But the papers in this collection tell a different story. In the first place, they problematize the account of marginalization by suggesting that "prevention" was a very malleable term. Indeed, for much of the twentieth century "prevention" tended to be a part of "early detection and treatment" and so, ironically, to be at the heart of cancer control. What were marginal—in both British and American control programs—were prevention efforts focused on environmental and lifestyle causes of the disease, which until the 1960s and 1970s tended to be subordinated to "early detection and treatment." In the second place, these papers also suggest that these different approaches to prevention came into conflict in the 1960s and 1970s, as political concerns about environmental and lifestyle causes of cancer emerged.

Reinventing Prevention

It should first be noted, however, that the 1960s and 1970s did not witness so much a difficult *birth* of approaches to prevention that focused on environmental and lifestyle causes of cancer, as a difficult *reinvention* of an older tradition of interest in these possible causes. This tradition can be traced back to antiquity, but it gained particular prominence in the early modern period with medical reports that said mortality from the disease was increasing, and that associated cancer with overindulgence,

44. Lerner, *Breast Cancer Wars* (n. 1), pp. 93–106.

for example in meat.[45] Medical and domestic health texts advised people to avoid activities that might excite the onset of cancer, such as a sharp knock, the wearing of corsets by women, or an excessive or wrong diet; to take sufficient exercise; and to maintain an easy and cheery disposition.[46] It was commonly recognized that not everyone who wore corsets, or ate too much or the wrong sorts of food, or was affected by depression, succumbed to cancer. Nor did everyone with a constitutional or hereditary predisposition get the disease. Rather, cancer was the outcome of a combination of exciting and predisposing causes, neither of which was sufficient in itself. It was not possible to identify everyone who might fall victim to the disease, but it was sometimes possible to modify the habits and conditions that might encourage it.

From the 1840s, statistical evidence reinforced earlier reports that cancer mortality rates were increasing in "civilized" nations (though it remained unsettled until the early twentieth century as to whether this increase was real, or the product of better diagnosis or greater awareness of the disease). A growing literature argued that so-called primitive or uncivilized peoples had a lower incidence of cancer than those in urban industrial nations, and that cancer mortality was lower among rural than urban populations.[47] Commentators claimed that it was caused by the

45. William Nisbet, *An Inquiry into the History, Nature, Causes, and Different Modes of Treatment Hitherto Pursued in the Cure of Scrophula and Cancer* (Edinburgh: Chapman, 1795), pp. 182–84; Nisbet, *An Inquiry into the History, Nature, Causes, and Different Modes of Treatment Hitherto Pursued in the Cure of Scrophula, Pulmonary Consumption, and Cancer to which is Appended an Appendix Containing a Letter to a Celebrated Professor of Edinburgh*, 2nd ed. (London: Scott, 1800), pp. 182–84; John O'Connor, *"An Inaugural Essay on Carcinoma or Cancer," submitted to the examination of Charles Alexander Warfield and the Medical Faculty of the College of Maryland on 1st May 1812 for the degree of Doctor of Physic* (Baltimore: Edes, 1812), p. 20.

46. For example, see William Hayle Walshe, *The Nature and Treatment of Cancer* (London: Taylor and Walton, 1846), pp. 191–92; William Buchan and William Nisbet, *The New Domestic Medicine, or, a Treatise on the Prevention and Cure of Diseases, by Regimen and Simple Medicines. With an Appendix, Containing A Dispensatory for the Use of Private Practitioners. To which is now added, Memoirs of the Life of Dr. Buchan: And Important Extracts from Other Works, Particularly His Advice to Mothers, On the Subject of Their Own Health, and the Means of Promoting the Health, Strength, and Beauty of Their Offspring, etc.* (London: Kelly, 1809), pp. 421–26, esp. p. 426. On Buchan and *Domestic Medicine*, see C. J. Lawrence, "William Buchan: Medicine Laid Open," *Med. Hist.*, 1975, *19*: 20–35; Charles E. Rosenberg, "Medical Text and Social Context: Explaining William Buchan's *Domestic Medicine*," *Bull. Hist. Med.*, 1983, *57*: 22–42; Richard B. Sher, "William Buchan's *Domestic Medicine*: Laying Book History Open," in *The Human Face of the Book Trade: Print Culture and Its Creators*, ed. Peter Isaac and Barry McKay (Winchester, U.K.: St. Paul's Bibliographies; New Castle, Del.: Oak Knoll Press, 1999), pp. 45–64.

47. For a discussion of cancer as a disease of civilization, see Proctor, *Cancer Wars* (n. 6), pp. 16–34.

stress of urban living; by the quality of the food and water supplies in the cities; and, especially from the late nineteenth and early twentieth centuries, by occupational hazards, including radiation, asbestos, dyes, and other chemicals.[48] Such concerns caused renewed attention to efforts to change people's habits to prevent cancer—but they also highlighted the need for broader social and political responses to the problem.

Thus by the early twentieth century cancer was often seen as a disease of urban-industrial populations, one that could be prevented through individual or social action to reduce exposure to risk. The point can be made by looking at arguments that attributed the rise of incidence or mortality to the changing diet of the urban population. Commentators variously argued that cancer was a result of the increase in meat consumption, the poor quality of urban food, modern methods of food preservation, the sheer quantity of food available, or the availability of new and exotic foodstuffs made possible by the growth of international trade and transportation. Such interest in diet and nutrition was supported by evidence that diet was crucial to the successful uptake of transplantable tumors in mice; by reports that cancer mortality fell with declines in meat consumption in Denmark and the United Kingdom during World War I; and by statistical correlations between the rise in cancer mortality and nineteenth-century changes in diet.[49] Vegetarians and temperance reformers seized upon

48. On radiation, see Claudia Clark, *Radium Girls: Women and Industrial Health Reform, 1910–1935* (Chapel Hill: University of North Carolina Press, 1997); Daniel Paul Serwer, *The Rise of Radiation Protection: Science, Medicine and Technology in Society, 1896–1935*, Informal Report BNL 22279, Brookhaven National Laboratory, 1976. For research on chemicals and cancer and its relationship to irritation theories of cancer causation, see Austoker, *History of the Imperial Cancer Research Fund* (n. 28), pp. 118–25. More generally on early-to-mid-century environmentalist approaches to environmental and occupational causes of cancer, see Proctor, *Cancer Wars* (n. 6), pp. 35–53. On asbestos, see Geoffrey Tweedale, with additional research by Philip Hansen, *Magic Mineral to Killer Dust: Turner and Newall and the Asbestos Hazard* (Oxford: Oxford University Press, 2000). On mule spinners' cancer, see T. Wyke, "Mule Spinners' Cancer," in *The Barefoot Aristocrats: A History of the Amalgamated Association of Operative Cotton Spinners*, ed. A. Fowler and T. Wyke (Littleborough: Kelsall, 1987), pp. 184–96.

49. On transplantation studies see, e.g., C. Moreschi, "Beziehungen zwischen Ernährung und Tumorwachstum," *Zeitschrift für Immunitätsforschung. Originale*, 1909, *2*: 651–75; Peyton Rous, "The Rate of Tumor Growth in Underfed Hosts," *Proc. Soc. Exp. Biol. & Med.*, 1910–11, *8*: 128–30; Rous, "The Influence of Diet on Transplanted and Spontaneous Mouse Tumors," *J. Exp. Med.*, 1914, *20*: 433–51; Eleanor Van Ness Van Alstyne and S. P. Beebe, "Diet Studies in Transplantable Tumors I," *J. Med. Res.*, 1913–14, *29*: 217–32; J. E. Sweet, Ellen P. Corson-White, and G. J. Saxon, "The Relation of Diets and of Castration to the Transmissible Tumors of Rats and Mice," *J. Biol. Chem.*, 1913, *15*: 181–91; Sweet, Corson-White, and Saxon, "On the Influence of Certain Diets upon the Growth of Experimental Tumors," *Proc. Soc. Exp. Biol. &*

the evidence of associations between meat and alcohol consumption and cancer to argue that dietary and alcohol reform would help prevent cancer.[50] For many other commentators, it was clear that moderation in food consumption, especially meat, was a key to prevention.

However, such concerns had little impact on American cancer-control programs that emerged in the early twentieth century. Led by the physician-dominated ASCC, these programs paid little attention to the causal role of environment or habit in cancer. Instead, they tended to focus on "early detection and treatment," which some came to define as "prevention"[51]—preventing the further growth of cancers established in the body, or preventing the onset of cancer by the removal of precancerous conditions. The ASCC was not persuaded by claims that certain habits such as diet caused cancer. Indeed, it often associated suggestions that diet caused or cured cancer with quackery and food faddism; its educational pamphlets stated that diet was not a cause of cancer, and that changes in diet would do little or nothing to prevent or treat the disease. The evidence for some environmental causes—notably radiation and some environmental chemicals[52]—was probably more widely accepted among cancer experts, some of whom were exposed to such dangers themselves. Nevertheless, at

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Med., 1912–13, *10*: 175–76. On declines in meat consumption, see S. Monckton Copeman and Major Greenwood, *Reports on Public Health and Medical Subjects*, no. 36, *Diet and Cancer with Special Reference to the Incidence of Cancer upon Members of Certain Religious Orders* (London: HMSO, 1926). For discussions of evidence of low cancer rates in "primitive" peoples, and statistical correlations between rising mortality in the West and changes in diet, see Frederick L. Hoffman, *Cancer and Diet, with Facts and Observations on Related Subjects* (Baltimore: Williams & Wilkins, 1937).

50. W. Roger Williams, *The Natural History of Cancer with Special Reference to Its Causation and Prevention* (London: Heinemann, 1908); Francis Albert Rollo Russell, *Preventable Cancer: A Statistical Research* (New York: Longmans, Green, 1912); J. Ellis Barker, *Cancer: How It Is Caused, How It Can Be Prevented* (New York: Dutton, 1924). On how alcohol might cause cancer, see the wonderful illustrations used by John Harvey Kellogg during his lectures: *Dr. Kellogg's Temperance Charts: Showing in a Series of Ten Plates the Physical Effects of Alcohol and Tobacco* (Battle Creek, Mich.: Health Publishing, 1882); copies available in the National Library of Medicine, NLM Unique ID: 101136438.

51. See, e.g., American Medical Association, Council on Health and Public Instruction, American Society for the Control of Cancer, *Prevention of Cancer Series*, Pamphlets 1–10 (1915–24). Even Germany with its focus on environmental and social causes of cancer also gave considerable emphasis to early detection and treatment: Proctor, *Nazi War on Cancer* (n. 1). For an extended review of this book, see David Cantor, "Cancer and the Nazis," *Sci. Cult.*, 2001, *10*: 121–33.

52. Clark, *Radium Girls* (n. 48); Serwer, *Rise of Radiation Protection* (n. 48); Austoker, *History of the Imperial Cancer Research Fund* (n. 28), pp. 118–25; Proctor, *Cancer Wars* (n. 6), pp. 35–53.

a time when doctors were besieged by cancer patients for whom they could do little, the priority shifted to patient care, and prevention was redefined in therapeutic and individualized terms that made the surgeons—and later the radiotherapists—who dominated control organizations central to the definition. Such a shift also meant that practitioners generally did not have to address the tricky political problem of intervention against the producers of environmental cancers.

The British seem to have abandoned environmental and hereditarian explanations of cancer less quickly than did their American counterparts, perhaps because the leaders of the British Empire Cancer Campaign were also prominent supporters of holistic and Hippocratic approaches to medicine.[53] Nevertheless, in Britain, as in the United States, therapeutic prevention came to displace—but not entirely replace—prevention aimed at reforming individual habits.[54] Thus, while individuals might be advised to reduce their exposure to irritants or infections by changing their clothing, diet, or dental habits, such recommendations seem to have given ground to advice to have surgeons or dentists remove sources of irritation or infection such as warts, moles, or bad teeth.[55] Few practitioners stopped giving hygienic advice about cancer prevention to their patients, but therapeutic prevention measures came to dominate the message of British cancer-control organizations in the early twentieth century.

In this volume two papers explore the therapeutic approaches to cancer prevention in the United States. Ilana Löwy's paper on differential diagnosis in breast cancer nicely traces the elision between cancer therapy and cancer prevention. She shows how, on the one hand, pre–World War I American physicians saw in differential diagnosis the hope of reducing the number of unnecessary surgical operations for breast cancer by identifying precancerous conditions before they turned cancerous. On the other

53. On the BECC, see Austoker, *History of the Imperial Cancer Research Fund* (n. 28). On holism and Hippocratism, see Christopher Lawrence and George Weisz, eds., *Greater than the Parts: Holism in Biomedicine, 1920–1950* (New York: Oxford University Press, 1998); David Cantor, ed., *Reinventing Hippocrates* (Aldershot: Ashgate, 2002).

54. Such definitions of prevention can be traced back to at least the mid-nineteenth century and to growing interest in prophylactic surgery. See, e.g., recommendations for circumcision as a preventive for cancer of the penis for individuals belonging to cancerous families: Walshe, *Nature and Treatment of Cancer* (n. 46), pp. 192–93.

55. For example, the British surgeon W. Sampson Handley, who claimed that a common factor in all cancers was chronic lymph stasis (essentially a general sluggishness of the lymph system), argued that cancer was often caused by dental infection—and secondary infections of the mouth, stomach, and bowel—and urged greater attention to dental hygiene: "Cancer of a dentally clean mouth is a rarity," he claimed (W. Sampson Handley, *The Genesis of Cancer* [London: Paul, Trench, Trubner, 1931], p. 222).

hand, she also shows how it promoted prophylactic surgery by identifying conditions that might lead to cancer. Women with such precancerous conditions were often told that the best hope of preventing cancer was the removal of their breasts. Raul Necochea shows how from the 1960s the American physician Henry Lynch turned to family pedigrees and then to molecular genetics to identify hereditary cancers—or precancerous conditions—at an earlier stage than they could otherwise be identified, and so to prevent the disease from establishing itself or, once established, from progressing further. Lynch, an advocate of prophylatic surgery, was also a strong proponent of a national registry system of cancer families to identify patients at risk of the disease, and to help in the estimation of risk for particular target organs. These papers build on a growing historical literature that highlights the importance to control/prevention of innovations in diagnostic technology, and of efforts to determine the forms and stages of cancer most amenable to intervention.[56]

"Early detection and treatment" dominated American and British approaches to cancer prevention until the 1970s, and they remain important today[57]—but in the 1960s and 1970s they were joined by a revived interest in environmental and lifestyle causes of cancer. Early twentieth-century doctors and scientists had focused some attention on such causes, but they tended to be subordinated to efforts to improve early detection and treatment. In both the United States and the United Kingdom this began to change in the late 1940s, with epidemiologic research undertaken in both countries that identified cigarette smoking as a cause of lung cancer.[58] Reports by the Royal College of Physicians (1962) and the

56. On staging, see Marie Ménoret, "The Genesis of the Notion of Stages in Oncology: The French Permanent Cancer Survey (1943–1952)," *Soc. Hist. Med.*, 2002, *15*: 291–302. On new technologies such as the Pap smear, see Monica J. Casper and Adele E. Clarke, "Making the Pap Smear into the 'Right Tool' for the Job: Cervical Cancer Screening in the USA, circa 1940–95," *Soc. Stud. Sci.*, 1998, *28*: 255–90; A. E. Clarke and M. J. Casper, "From Simple Technology to Complex Arena: Classification of Pap Smears, 1917–90," *Med. Anthrop. Quart.*, 1996, *10*: 601–23. For work on family histories, see Cantor, "Frustrations of Families" (n. 18); Paolo Palladino, "Between Knowledge and Practice: On Medical Professionals, Patients, and the Making of the Genetics of Cancer," *Soc. Stud. Sci.*, 2002, *22*: 137–65.

57. Breslow et al., *History of Cancer Control* (n. 1).

58. Allan M. Brandt, "Cigarette Risk and American Culture," *Daedalus*, 1990, *119*: 155–76. On the vast historical literature on smoking and cancer, see John C. Burnham, "American Physicians and Tobacco Use: Two Surgeons General, 1929 and 1964," *Bull. Hist. Med.*, 1989, *63*: 1–31; John Parascandola, "The Surgeons General and Smoking," *Pub. Health Rep.*, 1997, *112*: 440–42; Mark Parascandola, "Cigarettes and the US Public Health Service in the 1950s," *Amer. J. Pub. Health*, 2001, *91*: 196–205; Colin Talley, Howard I. Kushner, and Claire E. Sterk, "Lung Cancer, Chronic Disease Epidemiology, and Medicine, 1948–1964," *J. Hist. Med. & Allied Sci.*, 2004, *59*: 329–74; Richard Kluger, *Ashes to Ashes: America's Hundred-Year Cigarette*

U.S. Surgeon General (1964) marked a shift in official attitudes toward the acceptance of epidemiologic proof that smoking "caused" cancer; the triumph of multicausal explanations of the onset of disease, a key moment in the emergence of the "risk factor" concept of disease; and the disciplinary formation of chronic-disease epidemiology.[59]

In some ways these changes were not entirely new. As I have mentioned, nineteenth- and early twentieth-century physicians had seen cancer as the outcome of many different causes. It was dependent on both constitutional and environmental factors, neither of which was sufficient to promote cancer. Diet, nervous stress, environment, heredity, and individual susceptibility might all contribute to the onset of the disease, but it was rarely the case that any one factor was sufficient in itself. Rather, cancer was the outcome of an often unknowable combination of factors. What was different about the new interest in the 1960s and 1970s in multifactorial causation was that it was built upon statistical calculations of risk and a new acceptance that statistical association could be deemed a cause under certain conditions. For such reasons, I refer to this new interest in lifestyle and environmental cancers not as a revival but as a *reinvention* of these concepts and their relation to cancer.

War, the Public Health, and the Unabashed Triumph of Philip Morris (New York: Knopf, 1996); John C. Burnham, *Bad Habits: Drinking, Smoking, Taking Drugs, Gambling, Sexual Misbehavior and Swearing in American History* (London: New York University Press, 1993); Amy Fairchild and James Cosgrove, "Out of the Ashes: The Life, Death, and Rebirth of the 'Safer' Cigarette in the United States," *Amer. J. Pub. Health*, 2004, *94*: 192–204; Matthew Hilton, *Smoking in British Popular Culture, 1800–2000: Perfect Pleasures* (Manchester: Manchester University Press, 2000); Stephen Lock, Lois Reynolds, and E. M. Tansey, eds., *Ashes to Ashes: The History of Smoking and Health* (Amsterdam: Rodopi, 1998); Jon M. Harkness, "The U.S. Public Health Service and Smoking in the 1950s: The Tale of Two More Statements," *J. Hist. Med. & Allied Sci.*, Advance Access published 15 September 2006, **doi:10.1093/jhmas/jrl015**. For additional citations, see nn. 59 and 60.

59. Mervyn Susser, "Epidemiology in the United States after World War II: The Evolution of Technique," *Epidemiol. Rev.*, 1985, *7*: 147–77, on pp. 150–51; Brandt, "Cigarette Risk" (n. 58), pp. 160–64; William G. Rothstein, *Public Health and the Risk Factor: A History of an Uneven Medical Revolution* (Rochester, N.Y.: University of Rochester Press, 2003), pp. 238–50; Mark Parascandola, "Skepticism, Statistical Methods, and the Cigarette: A Historical Analysis of a Methodological Debate," *Perspect. Biol. & Med.*, 2004, *47*: 244–61; Luc Berlivet, "'Association or Causation?' The Debate on the Scientific Status of Risk Factor Epidemiology, 1947–c. 1965," in *Making Health Policy: Networks in Research and Policy after 1945*, ed. Virginia Berridge (Amsterdam: Rodopi, 2005), pp. 39–74; Mark Parascandola, "Epidemiology in Transition: Tobacco and Lung Cancer in the 1950s," in *Body Counts: Medical Quantification in Historical and Sociological Perspectives*, ed. Gérard Jorland, Annick Opinel, and George Weisz (Montreal: McGill-Queen's University Press, 2005), pp. 226–48; Harkness, "U.S. Public Health Service and Smoking" (n. 58).

In a series of recent articles, Virginia Berridge has traced the particular trajectory of this transition in Britain.[60] In this volume she highlights the importance of the smoking/lung cancer debate to certain other transformations. It will be recalled that British cancer agencies had been remarkably reluctant to direct cancer-education programs toward the public. Berridge suggests that the 1962 RCP report was the harbinger of a major change in policy: after 1962, medical and public health agencies gave up their earlier anxieties about public education and embraced media health campaigns aimed at the public. Coming at a time of increasing cultural emphasis on "permissiveness" regarding lifestyle, such campaigns, Berridge argues, marked the beginnings of attempts by the state to regulate or control the new emphasis on tolerance and open-mindedness. She sees the embrace of the media as part of a broader emergence of what she calls a "coercive permissiveness" that emphasized both individual responsibility and governmental intervention in individual behavior.

The Politics of Prevention

The new interest in lifestyle causes of cancer posed a major threat to the centrality of therapeutics to control and prevention. From the 1960s, critics argued that despite an enormous investment in therapeutics, the survival rates for most cancers—except for some cancers in children—had not increased substantially in thirty years.[61] Indeed, as Carsten Timmermann demonstrates in this volume, research into the treatment of lung cancer had been particularly disappointing. Increasingly, these critics claimed that therapeutics should give way to other approaches. Efforts

60. Virginia Berridge, "Science and Policy: The Case of Postwar British Smoking Policy," in Lock, Reynolds, and Tansey, *Ashes to Ashes* (n. 58), pp. 143–63; Berridge, "Passive Smoking and Its Pre-History in Britain: Policy Speaks to Science?" *Soc. Sci. & Med.*, 1999, *49*: 1183–95; Berridge, "Post-war Smoking Policy in the UK and the Redefinition of Public Health," *Twent. Cent. Brit. Hist.*, 2003, *14*: 61–82; Virginia Berridge and Penny Starns, "The 'Invisible Industrialist' and Public Health: The Rise and Fall of 'Safer Smoking' in the 1970s," in *Medicine, the Market and the Mass Media: Producing Health in the Twentieth Century*, ed. Virginia Berridge and Kelly Loughlin (London: Routledge, 2005), pp. 172–91. See also Berridge and Loughlin, "Smoking and the New Health Education" (n. 30).

61. "The War on Cancer—Are We Winning It?" first published in *Newsday*, January 1977; reprinted in Senate Committee on Agriculture, Nutrition, and Forestry, Subcommittee on Nutrition, *Nutrition and Cancer Research: Hearings before the Subcommittee on Nutrition of the Committee on Agriculture, Nutrition, and Forestry, United States Senate, Ninety-fifth Congress, Second Session, on Overview of Nutrition Research at the National Institutes of Health with Particular Emphasis on the National Cancer Institute, June 12 and 13, 1978* (Washington, D.C.: U.S. Government Printing Office, 1978), pp. 100–137.

targeted at smoking and other lifestyle causes of cancer seemed to have much better prospects of reducing cancer mortality and incidence, as did efforts that targeted environmental and occupational causes of this group of diseases. I conclude this section with a brief account of how these challenges to therapeutics played out in the second half of the twentieth century, and their impact on the meanings of prevention in this period. My argument here focuses primarily on the United States, where the secondary literature is strongest.

To advocates of therapeutic approaches to cancer control and prevention, the new emphasis on lifestyle was particularly worrying, since it seemed to find increasing popular and political support. From the late 1960s, Congress and advocacy groups began to pressure cancer agencies to shift attention to tobacco and (from the 1970s) also to diet, which critics argued was the second preventable cause of cancer after smoking.[62] At the same time, there was growing interest in environmental and occupational causes of cancer associated with industrial chemicals, pesticides, food additives, radiation, asbestos, and new drugs.[63] The ACS, the NCI,

62. Stephen Hilgartner, *Science on Stage: Expert Advice as Public Drama* (Stanford, Calif.: Stanford University Press, 2000); David Cantor, "Between Prevention and Therapy: Gio Batta Gori and the National Cancer Institute's Diet, Nutrition and Cancer Program, 1974–1978," unpublished ms.

63. On asbestos, see Tweedale and Hansen, *Magic Mineral* (n. 48); Jock McCulloch, *Asbestos Blues: Labour, Capital, Physicians and the State in South Africa* (Oxford: James Currey; Bloomington: Indiana University Press, 2002); Ronald Johnston and Arthur McIvor, *Lethal Work: A History of the Asbestos Tragedy in Scotland* (East Linton, Scotland: Tuckwell, 2000). For alternative perspectives on industry responses to the health effects of asbestos, see Peter Bartrip, *The Way from Dusty Death: Turner and Newall and the Regulation of Occupational Health in the British Asbestos Industry, 1890s–1970* (London: Athlone, 2001); Rachel Maines, *Asbestos and Fire: Technological Trade-Offs and the Body at Risk* (New Brunswick, N.J.: Rutgers University Press, 2005). On radiation, see J. Samuel Walker, *Permissible Dose: A History of Radiation Protection in the Twentieth Century* (Berkeley and Los Angeles: University of California Press, 2000); Sarah Dry, "The Population as Patient: Alice Stewart and the Controversy over Low-Level Radiation in the 1950s," in *The Risks of Medical Innovation: Risk Perception and Assessment in Historical Context*, ed. Thomas Schlich and Ulrich Tröhler (London: Routledge, 2006), pp. 116–32. On drugs, see the complex debates on the relation of the Pill and cancer in Lara V. Marks, *Sexual Chemistry: A History of the Contraceptive Pill* (New Haven: Yale University Press, 2001), chap. 7; Elizabeth Siegel Watkins, *On the Pill: A Social History of Oral Contraceptives, 1950–1970* (Baltimore: Johns Hopkins University Press, 1998), esp. chap. 4; Jean-Paul Gaudillière, "Hormones at Risk: Cancer and the Medical Uses of Industrially-Produced Sex Steroids in Germany, 1930–1960," in Schlich and Tröhler, *Risks of Medical Innovation* (n. 63), pp. 148–69. On food hormones such as DES, see Alan I. Marcus, *Cancer from Beef: DES, Federal Food Regulation, and Consumer Confidence* (Baltimore: Johns Hopkins University Press, 1994). On chemicals, see Gerald Markowitz and David Rosner, *Deceit and Denial: The Deadly Politics of Industrial Pollution* (Berkeley and Los Angeles: University of California Press; New

and other cancer agencies found themselves under growing pressure to divert resources from therapy-related activities to work that focused on lifestyle or environmental causes of the disease.

Against such a backdrop, therapists adopted two political strategies. First, they increasingly sought common cause with lay advocacy groups to persuade Congress and the public to put more resources into finding a cure for cancer. In their view, the new preventive strategies offered little immediate prospect of reducing cancer mortality or incidence, with perhaps the exception of lung cancer and some occupational cancers; more importantly, they offered little for the many thousands of people who faced cancer in the 1960s and 1970s, for whom the urgent need was for better treatment. Therapeutic approaches to cancer might not have resulted in a decline in cancer mortality, they claimed, but that was no argument for abandoning those who fell victim to the disease; rather, it made a strong case for more effort in this direction. Whatever their sympathy for prevention efforts focused on lifestyle, environment, or occupation, physicians remained focused on their sick patients, and were anxious that resources might disappear into a seemingly bottomless hole of preventive policies that offered little prospect of reducing cancer incidence or mortality for many years, if ever.

Second, therapists also began to revive the older notion of "early detection and treatment" as prevention, and so to piggyback therapeutics onto the new interest in prevention. It was a timely move, given new technical developments—such as the Pap smear (1940s), the use of mammography in screening (from 1960s), and later genetic testing (1980s–1990s)[64]—that

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York: Milbank Memorial Fund, 2002). On hormone replacement therapy and cancer, see the survey by Nancy Krieger, Ilana Löwy, Robert Aronowitz, et al., "Hormone Replacement Therapy, Cancer, Controversies, and Women's Health: Historical, Epidemiological, Biological, Clinical, and Advocacy Perspectives," *J. Epidemiol. & Commun. Health*, 2005, *59*: 740–48. On the growth of EPA interest in cancer prevention, see Edmund P. Russell III, "Lost among the Parts per Billion: Ecological Protection at the United States Environmental Protection Agency, 1970–1993," *Envir. Hist.*, 1997, *2*: 29–51.

64. On the Pap smear, see Casper and Clarke, "Making the Pap Smear" (n. 56); Clarke and Casper, "From Simple Technology" (n. 56). On mammography, see Barron H. Lerner, "'To See Today with the Eyes of Tomorrow': A History of Screening Mammography" (Background paper for the Institute of Medicine report, *Mammography and Beyond: Developing Technologies for the Early Detection of Breast Cancer*, March 2001); Barron H. Lerner, "'To See Today with the Eyes of Tomorrow': A History of Screening Mammography," *Can. Bull. Med. Hist.*, 2003, *20*: 299–321; Lerner, *Breast Cancer Wars* (n. 1), pp. 196–222, 242–50; Gardner, *Early Detection* (n. 1), pp. 179–86. On cancer genetics, see Shobita Parthasarathy, "Architectures of Genetic Medicine: Comparing Genetic Testing for Breast Cancer in the USA and the UK," *Soc. Stud. Sci.*, 2005, *35*: 5–40; Pascale Bourret, "BRCA Patients and Clinical

allowed the identification of cancers and of risks of cancer at earlier stages than had hitherto been possible. Such innovations generated considerable medical, scientific, and commercial interest in promoting "early detection and treatment" as a form of prevention, and revived older interests in prophylactic surgery, for example against breast cancer. Radiological, imaging, pharmaceutical, and genomics companies thus joined with physicians to promote new medicalized and individualized notions of prevention—a move that divided the growing number of lay advocacy groups, some of which (perhaps the most visible) came to press for greater resources for cancer therapy, while others rejected preventive efforts that did not focus on environmental or lifestyle causes of cancer.[65]

Such a revival of older notions of prevention attracted support from biomedical scientists who found advocates of environmentalist and lifestyle approaches to cancer to be critical of the investment in basic research, for example in viruses after the 1971 Cancer Act.[66] It also found support from industries that were threatened by the environmentalist lobby and its supporters in Congress. Many companies sought to deny or obscure evidence that their products or processes caused cancer, to muffle the

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Collectives: New Configurations of Action in Cancer Genetics Practices," ibid., pp. 41–68; Jean-Paul Gaudillière and Ilana Löwy, "Science, Markets and Public Health: Contemporary Testing for Breast Cancer Predispostion," in Berridge and Loughlin, *Medicine, the Market and the Mass Media* (n. 60), pp. 266–88.

65. On women's advocacy in particular, see Lerner, *Breast Cancer Wars* (n. 1); Gardner, *Early Detection* (n. 1); Ellen Leopold, *A Darker Ribbon: Breast Cancer, Women, and Their Doctors in the Twentieth Century* (Boston: Beacon Press, 1999); James S. Olson, *Bathsheba's Breast: Women, Cancer, and History* (Baltimore: Johns Hopkins University Press, 2002); Amy Sue Bix, "Diseases Chasing Money and Power: Breast Cancer and AIDS Activism Challenging Authority," in *Health Care Policy in Contemporary America*, ed. Alan I. Marcus and Hamilton Cravens (University Park: Penn State University Press, 1997), pp. 5–32; Maren Klawiter, "Chemicals, Cancer and Prevention: The Synergy of Synthetic Social Movements" in *Synthetic Planet: Chemical Politics and the Hazards of Modern Life*, ed. Monica J. Casper (New York: Routledge, 2003), pp. 155–75; Klawiter, "Risk, Prevention and the Breast Cancer Continuum: The NCI, the FDA, Health Activism and the Pharmaceutical Industry," *Hist. & Technol.*, 2002, *18*: 309–53; Klawiter, "From Private Stigma to Global Assembly: Transforming the Terrain of Breast Cancer," in *Global Ethnography: Forces, Connections, and Imaginations in a Postmodern World*, ed. Michael Burawoy, Joseph A. Blum, Sheba George, et al. (Berkeley and Los Angeles: University of California Press, 2000), pp. 299–334. On the role of advocacy groups in testing for breast cancer predisposition see Gaudillière and Löwy, "Science, Markets and Public Health" (n. 64).

66. For an example of such an attack on virus research, see Cantor, "Between Prevention and Therapy" (n. 62). On virus research, see Angela N. H. Creager and Jean-Paul Gaudillière, "Experimental Platforms and Technologies of Visualisation: Cancer as Viral Epidemic," in Gaudillière and Löwy, *Heredity and Infection* (n. 18), pp. 203–41.

public pronouncements of those of their own scientists who suggested that such dangers were real, and to garner political support against the public health lobby. Such responses formed a constant problem for those seeking to promote concern about lifestyle and environmental causes of cancer: too often, they complained, the industries concerned attempted to thwart their efforts to identify such risks, to shift responsibility from themselves to individuals affected by the disease by suggesting that their behaviors were the problem and not the actions of the industries concerned, and to promote forms of intervention that did not compromise their commercial interests.[67]

The consequence was particularly hard for those interested in occupational and environmental causes of cancer.[68] Following a growth of interest in these causes during the 1960s and 1970s, policy began to drift elsewhere with growing scientific criticism that their contribution to the overall cancer burden had been overestimated, and, in the early 1980s, with the election of President Ronald Reagan. The Reagan administration and its ideologues found medicalized notions of prevention that emphasized individual responsibility much less threatening than environmentalist lobbies that promoted greater regulation. Thus policies aimed at prevention based on lifestyle (smoking and diet) and "early detection and treatment" grew at the expense of prevention strategies aimed at challenging occupational and environmental cancers through governmental intervention. Critics responded that the NCI and the ACS downplayed the evidence for increasing cancer rates and their relation to avoidable exposure to industrial and environmental carcinogens. Instead, such critics claimed, these organizations, together with the chemical, radiation, and other industries, focused attention on dietary fat (ignoring industrial contaminants such as pesticides) and smoking (ignoring increasing lung-cancer rates in nonsmokers, and the important role of occupational exposure and urban air pollution) as the predominant causes of cancer mortality and incidence. They were obsessed with diagnosis, treatment, and basic research, and indifferent to cancer cause and prevention.[69]

Such criticisms highlight a further fracture in the debates over cancer prevention in the last third of the twentieth century. As occupational and environmental causes of cancer were increasingly ignored, critics came to worry that an emphasis on lifestyle factors distracted attention from

67. See the citations in n. 63.

68. Proctor, *Cancer Wars* (n. 6), pp. 75–100.

69. Samuel S. Epstein, "Losing the 'War against Cancer': A Need for Public Policy Reforms," *Internat. J. Health Sci.*, 1992, *22*: 455–69.

broader structural factors that promoted cancer.[70] In their view, lifestyle approaches to cancer were often characterized by an outlook on disease that emphasized the role of individual behavior rather than environmental and social factors in disease causation, and so focused attention more on efforts to change individual conduct than on social institutions, industrial production, or governmental regulation. Others argued that such individualist approaches also carried moralistic values that held individuals responsible for their cancers despite evidence that social-structural factors played an important role in determining disease in populations. Put another way, critics suggested, the new emphasis on lifestyle focused mainly on *apparent* choices, conceiving of individuals as consumers who could be educated to make more informed decisions regarding their health—but this was to ignore that personal choices were shaped largely by social structures.

The result of such debates has often been a confusion of preventions. Despite efforts since the 1950s to rationalize the different approaches to cancer prevention by creating categories of primary, secondary, and tertiary prevention (see Glossary for recent guidelines),[71] there remains disagreement on where the boundaries between therapy and prevention lie, on whether tertiary prevention is an attempt by therapists to sponge off of the new enthusiasm for prevention, and on what constitutes each of the three approaches.[72] The labels have been used in quite contradictory ways, and some interventions seem to fit into more than one category. Others reject the label "prevention" being attached to anything that

70. Christopher Sellers, "Discovering Environmental Cancer: Wilhelm Hueper, Post–World War II Epidemiology, and the Vanishing Clinician's Eye," *Amer. J. Pub. Health*, 1997, *87*: 1824–35. See also Proctor, *Cancer Wars* (n. 6), esp. chaps. 3–4. For an example of the debates in the 1980s, see the debate between Richard Peto and Samuel Epstein in Richard Peto, "Distorting the Epidemiology of Cancer: The Need for a More Balanced Overview," *Nature*, 1980, *284*: 297–300; Samuel S. Epstein and Joel B. Swartz, "Fallacies of Lifestyle Cancer Theories," *Nature*, 1981, *289*: 127–30.

71. In 1957 the U.S. Commission on Chronic Illness classified prevention into primary, secondary, and tertiary prevention: primary prevention aimed at the reduction of the incidence of a specific illness; secondary prevention, the reduction of the prevalence of an illness; and tertiary prevention, the reduction of the amount of disability resulting from a specific illness. See U.S. Commission on Chronic Illness, *Chronic Illness in the United States*, vol. 1: *Prevention of Chronic Illness* (Cambridge: Harvard University Press, 1957), pp. 126–43; H. R. Leavell and E. G. Clark, *Preventive Medicine for the Doctor in His Community: An Epidemiologic Approach* (New York: McGraw-Hill, 1965).

72. For example, chemoprevention is sometimes labeled as tertiary prevention, sometimes as having the goal of primary prevention (preventing the occurrence of the disease), sometimes as secondary prevention (early detection and reversion of tumors at a premalignant stage), and sometimes as some combination of the three.

does not focus on environmental or occupational causes.[73] In part, these divisions are derived from technical debates within cancer control—but they also reflect the harsh politics of the latter part of the century, the struggle for resources, ideological divisions over public policy, and efforts of powerful vested interests to shape cancer policy to their own interests. Prevention, like control, involved a multiplicity of (sometimes contradictory) meanings and approaches—a confusion of meanings shaped as much by politics as by science.

The Essays

The essays that follow are divided into three parts. The papers in Part I—Between Education and Marketing—explore the ways in which cancer-control organizations have sought to persuade people to change their behaviors regarding cancer, set this in the context of broader media representations of cancer, and discuss the different approaches to cancer education in Britain and the United States. Three of the essays—those by Gretchen Krueger, Elizabeth Toon, and me—have already been summarized in the context of the discussion of different British and American approaches to cancer education. Here I wish to make a further point, that these essays can also be read as accounts of different approaches to the marketing of cancer, especially when read alongside Susan Lederer's essay on Hollywood portrayals of cancer.

The intertwining of marketing and education is well illustrated by the situation of American cancer control in the first half of the twentieth century. Physician leaders of cancer-control organizations such as the ASCC/ACS saw themselves as competing for patients and public support with alternative practitioners, purveyors of patent medicines, folk healers, and physicians whom they regarded as ignorant of the disease and

73. Silvio De Flora, Alberto Izzottia, Francesco D'Agostinia, Roumen M. Balanskyb, Douglas Noonanc, and Adriana Albinic, "Multiple Points of Intervention in the Prevention of Cancer and Other Mutation-Related Diseases," *Mutat. Res./Fund. & Molec. Mech. Mutagen.*, 2001, *480–81*: 9–22; "A Comprehensive Approach to Cancer Prevention and Control: A Vision for the Future," in *Prevention Strategies That Work* (Steps to a Healthier U.S. Initiative, U.S. Department of Health and Human Services, 2003), esp. p. 25; Gail L. Shaw, "Editorial: Cancer Prevention—Perspectives and Implications," *Cancer Control J.*, March/April 1997, *4* (2): **https://www.moffitt.usf.edu/pubs/ccj/** (accessed 18 September 2006). On chemoprevention, see Jennifer Fosket, "Constructing 'High-Risk Women': The Development and Standardization of a Breast Cancer Risk Assessment Tool," *Sci. Technol. & Hum. Val.*, 2004, *29*: 291–313; Fosket, "Breast Cancer Risk and the Politics of Prevention: Analysis of a Clinical Trial" (Ph.D. diss., University of California, San Francisco, 2002).

its treatments. Their efforts to educate the public about early detection and treatment thus were not only about appropriate care, but were also attempts to control a highly competitive market in cancer care by dissuading patients from going elsewhere for treatment. For such reasons, these leaders were doubly anxious to ensure that their educational efforts did not scare off the public: anxious that they did not undermine public compliance with the message of early detection and treatment, and anxious that they did not undermine the opportunities that such compliance created for controlling the market in cancer care.

Thus my essay account of how the educational technology of the movie threatened to undermine cancer-control programs can also be read as an account of how it threatened to undermine ASCC/ACS efforts to manage a volatile market in cancer care. To the extent that the technology promoted awareness of the value of early diagnosis, it was good for expanding therapeutic business opportunities (at least for those not defined as "quacks," purveyors of patent medicines, or ignorant physicians). To the extent that it promoted excessive fear of the disease or its treatment, it could ultimately undermine such opportunities by dissuading people from seeking help and driving them into the arms of the competition. Therefore, the control organizations needed to develop strategies that did not defeat the original purposes of the campaigns. Cancer control was as much about controlling markets and personal behaviors as it was about controlling disease.

Gretchen Krueger's essay also highlights the intertwining of education and marketing, with reference to leukemia. She argues that in media campaigns for this disease the image of the child was central to efforts to promote programs of early detection and treatment. But such images were not only about promoting the health of the child, they were also about efforts to build a business of leukemia around chemotherapeutic approaches to the disease, and to encourage donations for further research in the field. Once again, efforts to control markets and publics went hand in hand with efforts to control diseases—a point that is stressed in both of our papers when we highlight how the 1944 takeover of the ACS by advertisers and business people transformed cancer education and marketing. Where I show how moviemaking expanded, diversified, and became better integrated with Hollywood and the entertainment industry, Krueger shows that the takeover was important to promoting the new field of chemotherapy, and the flexible responsiveness of cancer marketing to changing client expectations and the effectiveness of therapeutics.

Susan Lederer's essay broadens the focus to set these developments in public education and marketing in the context of Hollywood's portrayal

of cancer. Lederer argues that Hollywood took a much greater interest in cancer than has previously been realized, and that this interest began to be more focused in the late 1930s, at about the same time that cancer agencies revived interest in using movies as a tool of public education. But whereas the development of the public health movie was driven by the imperatives of cancer control and the medical market in cancer diagnosis and therapy, Hollywood was driven by the imperatives of the business of entertainment. Thus, for example, Lederer shows that while the ASCC/ACS and Hollywood sought to exclude certain issues from their films, Hollywood's concerns were very different from those of the public-education cancer movie. Where the ASCC/ACS worried that movie portrayals of the operating room and recovery process might undermine programs of cancer control, Hollywood was often happy to follow patients into the operating theater, and to show surgeons failing to cure. For Hollywood, it was issues of mercy killing and aesthetics that structured what was shown: the industry tended to exclude the possibility of euthanasia from its movies, and to focus on nondisfiguring cancers such as brain tumors. Given the cultural prominence of Hollywood's portrayal of cancer, these were imperatives with which the public-education efforts discussed by Krueger and by me had to engage.

How different things were in Britain. In the first place, British cancer agencies seem to have been less concerned than their American counterparts by the competition of quacks, patent-medicine purveyors, folk healers, and others—in part because such competition was less of a threat within highly centralized organizations such as the NRC and later the NHS. In the second place, while the transformation of cancer marketing and education in America after 1944 occurred in the context of vast economic growth, an unprecedented consumer boom, the expansion of state and private support for research, and the impetus of a market-driven health-care system, the situation in postwar Britain was very different. The country was more or else bankrupted by war, the economy was in the doldrums, rationing continued until the early 1950s, and the country was moving toward a taxation-driven health-care system. Marketing cancer—or simply educating people about it—was quite problematic in such a context, as Elizabeth Toon's essay demonstrates. Her account of the unwillingness of the British to educate the public (as opposed to the profession) can be read as an account of how the British also sought to control the spending of tax revenue on health care. The relative failure of the Manchester experiment illustrates the point. One of the implications of the Manchester experiment was that people's attitudes toward cancer control would change if cancer services improved—yet such improve-

ments would have required vast inputs of Treasury monies, and would also have needed substantial innovations in therapy and care, neither of which could easily be promised. No small wonder, then, that the British were unwilling to go down the American route of vast, aggressive cancer-education programs: while such campaigns were welcomed as stimulating demand in a market-driven health system, they were less welcome for the same reason in a taxation-driven health-care system where the imperative was to limit costs. Cancer control, in Toon's account, was as much about controlling costs as it was about controlling disease.

While Part I focuses on how cancer agencies sought to attract public support for their programs of control, Part II—Therapeutics—focuses on the therapeutic modalities at the heart of control. The authors trace the different meanings of and approaches to therapy—especially radiotherapy and chemotherapy—in Britain and the United States, the ways in which different professional groups and individuals sought to create opportunities for themselves through these modalities, how state and market medicine shaped cancer services, and how patients responded to this.

Ornella Moscucci's paper explores why British feminist doctors turned to radium therapy in the first three decades of the twentieth century. Focusing on cervical cancer, Moscucci argues that radium was of particular interest to feminists because of their long history of opposition to gynecological surgery. Radium provided both an opportunity to improve cure rates, and an alternative to the severe mutilation associated with surgical interventions against cervical cancer. Cancer control, in Moscucci's account, was as much about controlling the activities of male surgeons as it was about controlling the disease. But feminists also had another interest in radium: Moscucci argues that it provided a means of improving women's access to medical education at a time when they were often excluded from training posts and honorary appointments at voluntary hospitals. She thus highlights the way in which the introduction of radiotherapy was tied up with feminist efforts to reform medicine, as both a practice and a profession. She also highlights the importance of the state to such feminist politics, for it provided the radium that feminist surgeons used to promote their agendas.

John Pickstone expands on the role of the state in his essay on the three major therapeutic modalities that developed in the first sixty to seventy years of the twentieth century: surgery, radiotherapy, and chemotherapy. In his account, interwar British radium therapy exemplified a model of

centralized—and partly state-supported—health care. As we have shown earlier, the modality was shaped by the National Radium Commission and later the National Health Service, which institutionalized radiotherapy in British medicine, and encouraged the development of teamwork in therapy at a time when most clinicians espoused a more individualist approach to medical work. But Pickstone also makes a further point: he argues that this organization of radiotherapy was associated with a particular form of knowledge, an analytic "way of knowing." Radiotherapeutic organizations broke complex things and events into their elements, promoted specialization in these elements, and then, to coordinate and rationalize their work, organized the specialists into teams, standardized the techniques, and systematically collected statistics to assess the impact of interventions.

The contrast with chemotherapy is striking. If radiotherapy under the NRC/NHS exemplified an analytic/rationalist model, Pickstone argues that post–World War II American chemotherapy exemplified a more inventive and experimentalist mode, which, through the practice of trials, shaped the new subprofession of medical oncology. Paradoxically, this experimentalist mode began with a huge investment by the state, notably through the federally funded National Cancer Institute. But while the Americans focused state involvement on trials research, they severely limited its involvement in routine cancer care: there was no centralized organization in the United States equivalent to the National Radium Commission or the National Health Service in Britain. Thus while initially developed with federal monies, Pickstone argues, American chemotherapy's prominence and professional form were shaped by the imperatives of the medical market.

Peter Keating and Alberto Cambrosio look more closely at the chemotherapeutic trial in post–World War II North America and Europe, exploring how various groups came together to shape its development. Their discussion of the protocol and its normalized version, the clinical practice guideline, makes the point. The authors show that the development of the protocol in the postwar period lies at the heart of modern cancer treatment research and practice. Protocols came to be linked in complex ways to all the key components of modern cancer treatment research: government agencies, pharmaceutical companies, nonprofit organizations, patients, and physicians were all involved in different ways with the protocol, both in its creation and in its application. Keating and Cambrosio's account thus employs the protocol—and the trial more generally—as a window onto the interrelations between all these groups and institutions as they contributed to the creation, evolution, and implementation of

the clinical trial, and the development of treatment modalities, research methodologies, disease concepts, and biological models. Put another way, protocols provide an opportunity to explore the dynamics of biomedical research at many different levels and across many different component parts of the cancer treatment/research enterprise. Pickstone argues that chemotherapy trials embodied modes of experimentalism and invention. Keating and Cambrosio show how trials also sought to rationalize the organization of chemotherapeutic research and practice.

Finally, Barron Lerner returns to the relations of cancer to feminism raised earlier by Moscucci, but from the perspective of one exceptional American patient in the 1970s. He examines how Rose Kushner built on her earlier campaigns against radical mastectomies as the treatment of choice for breast cancer in the United States to raise questions about the use of adjuvant chemotherapy for breast cancer. As Lerner notes, Kushner's activism emerged from a combination of feminist politics, journalistic experience, and her personal unwillingness to accept the public health message put out by the cancer agencies. Her relative success in challenging the public health message laid the groundwork for some of the breast cancer activists of the 1980s. It also raises questions about the boundaries between lay and expert knowledge that were becoming politicized during this period, and about the politicization of control. If the physicians who ran cancer-control programs routinely sought to control the behaviors of patients as much as the disease itself, Kushner shows how patients could mirror these meanings of control: they sought to control not only the disease, but also the behaviors of the physicians who treated them.

It should be clear by now that cancer control meant many different things. For most of the twentieth century it was focused on the control of the disease as a biological entity through early detection and treatment—attempts to control its development in the body, and, by extension, to control mortality from the disease, and perhaps its incidence. But such efforts were generally embedded in a range of other activities—attempts to control health behaviors, markets, health-care costs, and the activities of quacks, folk healers, the media, and "ignorant" medical practitioners—all of which had an effect on attempts to control the biological disease. Part III of this collection—Prevention and Risk—problematizes the distinction between cancer control and prevention. The authors explore the ways in which prevention/control was shaped by the development of new innovations in diagnostic and screening technology, molecular genetics,

and the statistical calculation of risk; and how the emergence of interest in lifestyle causes of cancer in Britain was embedded in broader shifts in approaches to controlling human health behaviors.

The complex interrelations of therapeutics, control, and prevention are explored in the first essay in this section. Ilana Löwy argues that, from before World War I, American physicians saw improvements in the differential diagnosis of breast lesions as a means of reducing the number of unnecessary radical surgeries, encouraging women to see a physician as soon as possible, and preventing malignant pathologies by removing lesions before they turned cancerous. In her account, the development of new pathological techniques—such as the frozen section—facilitated the identification of precancerous lesions so that they might be surgically removed. Surgery thus became a form of prevention. For example, women who were diagnosed with "chronic mastitis" or "cystic disease of the breast" were commonly advised to have a mastectomy, in the belief that this reduced their risk of cancer. Yet difficulties in stabilizing the prognostic meaning of so-called precancerous lesions problematized this approach: it remained unclear whether they were really precancerous, and, if precancerous, what the chances were of their developing into cancer. Löwy argues that from the 1950s these conditions were replaced by "carcinoma in situ," and that recent developments of tests for hereditary predisposition to breast cancer are a continuation of attempts to detect what she calls an "embodied risk" of cancer, and to eliminate this risk by cutting it out.

Raul Necochea's paper on the American physician Henry Lynch develops Löwy's point, about the continuity between early detection and treatment and contemporary interest in hereditary predispositions to cancer, from a different perspective. Beginning in the 1960s, Lynch used family studies to identify a statistical *risk* of cancer among individuals with relatives who had cancer, a risk that could be identified long before the onset of the disease or of precancerous signs or symptoms. Lynch hoped that by identifying a hereditary risk of cancer among relatives of patients with cancer he might be able to improve programs of early detection and treatment. But the evidence from family studies was unpersuasive to most scientists and doctors, prompting Lynch to begin a long search for more convincing means of identifying risk. Focusing on hereditary nonpolyposis colorectal cancer (HNPCC), Necochea argues that it was only in the 1990s that the identification of genes associated with the disease transformed it from one that a few physicians believed ran in families to one with precise genetic components that researchers generally accepted, and that could be detected through genetic tests. The irony of such wide acceptance, however, was, as Necochea notes, that the "cancer family"

construct was crucial in the search for the HNPCC genes, and that the diagnosis of HNPCC continued to require that the mutated genes be found within a kin group that is generally accepted as a "cancer family."

Löwy's and Necochea's papers both problematize the distinction between cancer control and cancer prevention. Both approaches were cast as preventive, but both were also located within the dominant early twentieth-century framework of control by means of early detection and treatment. Paradoxically, the paper by Virginia Berridge on lung cancer and smoking also problematizes the distinction between control and prevention, but in a different way. In the first place, hers is an account of the rebirth or reinvention of interest in lifestyle causes of cancer in 1960s and 1970s Britain. She argues that the 1962 Royal College of Physicians (RCP) report marked the creation of what she calls a "policy community" around public health that linked government civil servants to medical experts outside, shifted the focus of public health toward individual behavior legitimated through population-based epidemiology, stimulated new attitudes on the part of the government in relation to the public on health issues, and encouraged a heightened role for research-based surveillance. It was thus a very different approach to prevention from that described by Löwy and Necochea.

In the second place, however, Berridge's account also reveals the interwoven nature of control and prevention. She shows how efforts to control rising cancer mortality were embedded in new efforts to control or shape human behavior. The RCP report, she argues, marked a new willingness on the part of medicine to speak to the public and to use the media to do so. Put another way, Berridge argues that efforts to prevent/control cancer were crucially tied up with new "mediatized" attempts to shape or control human behaviors. In her view, the report and the media efforts that followed it were heralds of a "coercive permissiveness" that embodied contradictions in approaches to public health in the 1960s. Health became a matter of individual responsibility, but the British conceived of individual responsibility within a new framework of governmental intervention in individual behavior. Members of the public could modify their own habits and lifestyles to attain better health, but that modification was increasingly state ordained and supported.

Finally, Carsten Timmermann returns us to the complex relations between therapeutics and prevention/control after World War II. It is often claimed that the identification of smoking as a cause of lung cancer has resulted in the neglect of therapy. Timmermann aims to debunk this claim, at least for Britain before the 1970s. In the first place, he suggests, research on lung-cancer therapy was not undermined by the stigma

associated with an allegedly self-inflicted illness, for the simple reason that smoking and lung cancer were not stigmatized before the 1970s. In the second place, Timmermann argues that from the 1950s the MRC in fact undertook a vigorous program of research to develop new therapeutic procedures against lung cancers. He claims that the failure to develop a successful treatment had more to do with the technical and ethical difficulties associated with the disease than with any stigma. More broadly, this failure also helped to ease the emergence, from the 1960s and 1970s, of policies aimed at preventing/controlling smoking. If Löwy and Necochea show how prevention could also *be* therapy and control, Timmermann shows how therapeutic failures could open the door to other approaches to prevention and control.

Glossary

Recent definition of primary, secondary, and tertiary prevention, Centers for Disease Control, National Center for Chronic Disease Prevention and Health Promotion

Primary prevention refers to the complete prevention of disease, often through methods that inhibit exposure to risk factors (e.g., preventing exposure to tobacco smoke).

Secondary prevention is meant to inhibit or reverse the effects of disease in its early stages, mainly through early detection (e.g., using the Pap test to discover and treat cervical neoplasia).

Tertiary prevention identifies the disease process and attempts to prevent further disability and restore a higher level of functioning (e.g., pain management or use of prostheses where indicated).

Source: *Guidance for Comprehensive Cancer Control Planning*, vol. 1: *Guidelines*, Division of Cancer Prevention and Control, Centers for Disease Control and Prevention, 4770 Buford Highway, NE, Atlanta, GA 30341, 25 March 2002, p. 122. Online version: **http://www.cdc.gov/cancer/ncccp/cccpdf/Guidance-Guidelines.pdf** (accessed 18 September 2006).