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# Biomedicine in the Twentieth Century: Practices, Policies, and Politics

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# Radium and the Origins of the National Cancer Institute

*David Cantor*

## Introduction

It is commonly supposed that the National Cancer Institute (NCI) began life in 1937 as a pure research organization, almost unsullied by its subsidiary functions of cancer control and prevention. Historians have shown that supporters of the 1937 Cancer Bill which led to the creation of the NCI strongly argued their case in terms of the need for research;<sup>1</sup> that the National Advisory Cancer Council (NACC), the NCI's advisory body, saw it as focused primarily on research;<sup>2</sup> and that basic and clinical research scientists took over the institute.<sup>3</sup> Most accounts of the history of post-1937 NCI thus tell the story of a research organization.<sup>4</sup> The general assumption is that research always dominated the NCI. An argument of this paper is that this assumption is quite mistaken. In its first fiscal year, the vast bulk of the NCI's money went not on research, but on routine therapy.

The point can be made by a focus on radium. The 1937 Act establishing the institute required the NCI to purchase radium, and Congress authorized the expenditure of \$200,000 for this purpose, far exceeding the estimated expenditure for anything else in the appropriation of \$400,000 for fiscal year 1938.<sup>5</sup> What must be recognized is that this radium was not intended for research.<sup>6</sup> Most of it was loaned to hospitals across the United States for the routine treatment of cancer, mainly for patients who otherwise would have been unable to afford the therapy. To put it another way, about half the budget of the NCI in its first

year went on the routine treatment of indigent patients. The NCI was a New Deal program that used the resources of the federal government to alleviate the harsh conditions of the Great Depression on the poor.

I am not the first to argue that the NCI was a New Deal program. In her account of how the genetically standardized mouse came to play a central role in American biomedical research, Karen Rader notes Clarence Little's call in 1932 for a "New Deal for mice," by which he meant a New Deal for "mice researchers" or "research."<sup>7</sup> Little was the head of the Jackson Laboratory in Bar Harbor, Maine, then in financial difficulties, and his call had the objective not only of making federal support for cancer research a New Deal program, but also of creating a research market for the laboratory's strain of mice, and (against vivisectionist objections) of making mice a morally acceptable stand-in for humans in the cancer laboratory. In some ways, Little succeeded in his goals. The Jackson Laboratory's strain of mice became an important tool in NCI research, helping to secure the laboratory's economic viability.

But Little's vision of the New Deal as promoting cancer research was only one of many, and it was not the one that predominated in the first year of the NCI. Research—be it on mice, or on any other experimental material—obtained a smaller proportion of the NCI's budget than the 50 percent that went on radium. In short, the NCI embodied at least two different visions of the New Deal—one that sought to use the resources of the federal government to promote research into causes and cures of cancer, and one that sought to use the resources of the federal government to help indigent patients with cancer. It was this latter vision of the New Deal that won out in the first year of the NCI, and advocates hoped it would continue for many years with continued purchases of radium. These hopes were not realized, and research and training rather than radium therapy eventually came to dominate the programs of the NCI. But, for a while in the late 1930s, this outcome was not certain.

This paper seeks to explain why this was the case. My argument is that the radium loan program was, in part, the result of political maneuvers that sought to respond to congressional desires to do something for existing cancer patients, while averting the possibility that these desires might result either in the creation of a large cancer treatment center in the Washington, D.C., area, or in a subsidy of diagnostic or treatment

centers across the country. Physicians and some supporters in Congress feared these possibilities would mark a further unwarranted expansion of government into the provision of health services, the Public Health Service (PHS) was reluctant to take on the responsibility, and researchers feared such outcomes would end their hopes that the NCI would be a research organization. Thus, while many disliked the idea of a radium loan program, they supported it so as to stop the other ideas of a proposed cancer hospital or subsidy. The first director of the NCI later recalled that in debates over the 1937 bill “the main question was whether to build another cancer hospital or whether to establish a National Institute, primarily devoted to cancer research,”<sup>8</sup> and he noted that the latter won out. I think it won out on the backs of the radium program, and ultimately of the vision of the NCI as providing care for the poor.

## Radium Therapy

Discovered in 1898, by World War I radium had become an important supplement (and sometimes alternative) to surgery, the mainstay of cancer therapy. Often it was used in the form of a salt, packed in milligram quantities into tubes or needles that could be inserted into natural or artificial cavities of the body in or around the tumor. The salt could also be placed in applicators that were positioned on the surface of the body or tumor, arranged in such a way as to deliver a particular dose of radiation to the growth. Alternatively, several grams of radium might be collected in one place. This radium might be used to produce radon which would be collected in small containers, sometimes called “seeds,” that were used in a similar way to the tubes or needles employed with the salt.<sup>9</sup> Several grams of radium might also be used at some distance from the body to produce a beam of gamma radiation in a manner akin to X-rays: the so-called “beam,” “bomb,” or “telecurie” therapy.<sup>10</sup>

Radium and radon therapy had complex relationships to surgery.<sup>11</sup> Some techniques required what was called a surgery-of-access to insert the tubes, needles, or “seeds” into the body. In addition, these and other techniques were often used in combination with surgery to counter pain and suffering in patients, to reduce “inoperable” tumors to operable size where they could be removed surgically, to help prevent recurrence

of cancer after surgery, to attack cancer cells that had spread out from the original growth, or some combination of all of these. In 1931 James Ewing, the director of the Memorial Hospital in New York, referred to the emergence of “radium surgery” as a new branch of surgery that aimed to cooperate with radiation in the treatment of cancer, but not to attempt alone to cure the disease.<sup>12</sup> Seven years later, in 1938, he noted that “bloodless” methods such as X-rays and radium had replaced surgery in treatment of some types of cancer, especially of the skin, pharynx and uterus.<sup>13</sup>

As the foregoing suggests, use of radium was appealing to surgeons for several reasons: because it built upon their existing skills, because it extended the reach of surgery into otherwise inoperable conditions, and because it promised other means of improving the effectiveness of surgical interventions. But it also had another appeal. Surgeons constantly complained that patients delayed too long in seeking care, often arriving in the physician’s office long after surgery could be effective.<sup>14</sup> Radium promised at least two ways of addressing this issue. First, it promised to tackle the consequences of delay by making advanced tumors more accessible to surgery. As has been noted, radium could reduce, to an operable size, tumors that had grown large during the period of delay, and it could kill cells that had spread out from the original cancer during this period. Second, radium promised to tackle the causes of delay by making medical interventions less frightening to patients. In the case of breast cancer, for example, cancer experts noted that part of the reason why people put off going to the physician was that they feared having to undergo a painful, mutilating operation that was popularly believed to be ineffective against cancer. Physicians acknowledged that radium therapy could be painful,<sup>15</sup> but did little publicly to discourage the popular belief that it was less painful and mutilating than surgery. Despite the need for a surgery-of-access, radium therapy was sometimes called surgery-without-the-knife, and before-and-after photographs routinely advertised cures by radium without the mutilation of surgery.

This is not to say that surgeons were unanimously in favor of radium. Some raised questions about its effectiveness compared to surgery or X-rays, some feared its harmful effects in the hands of inexperienced physicians, and some saw it as a threat to the reputation of cancer

Figure 1. Radiumized Paste  
 Frame grab from *Reward of Courage* (1921).



The emergence of radium as an alternative and supplement to surgery in orthodox practice was threatened by its use in alternative “quack” therapies. The American Society for the Control of Cancer (ASCC) attempted to discredit “quack” uses of radium by claiming that they were ineffective, and that quacks were motivated mainly by money, and bordered on the criminal. In the ASCC’s educational movie *Reward of Courage* (1921), the fictional quack Morris Maxwell fraudulently attempts to sell Radiumized Paste as a cure for cancer and is eventually arrested for his efforts.

therapy, especially given its associations with quackery.<sup>16</sup> (Figure 1) Surgical enthusiasm for radium was thus initially patchy, with enthusiasts and doubters debating its effectiveness in different types of cancer, at different stages of tumor growth, in combination with other modalities, and in the hands of particular practitioners.

In the 1920s and especially the 1930s, these debates intensified as large numbers of physicians flooded into the field, deepening earlier concerns among cancer agencies about inexperienced physicians taking up the therapy without sufficient understanding of its dangers, or the complexities of dosage, filtration, and administration of treatment.<sup>17</sup> To these critics, some of the new radium enthusiasts were moved less by concern for their patients than by a desire for profit. As Daniel Quigley, the director

of the Radium Hospital of Omaha, Nebraska, put it in 1929, targeting the growing tendency of physicians to rent radium:

The proper use of radium requires the highest degree of skill and the greatest amount of experience, but the renting of radium puts it into the hands of the unskilled and dishonest. There can be only one motive in renting radium; that motive is the desire to get a fee and a fee to which obviously the doctor renting the radium is not entitled. He exploits his patients for a price, often causes death or disability on account of insufficient or bungling treatment, and causes all radium treatment to be cursed.<sup>18</sup>

For Quigley and others, commercial radium rental agencies were complicit in this problem, often issuing doctors with “full directions” for the use of radium in lieu of formal training.<sup>19</sup>

Criticism of the commercial motives behind radium renting also highlights growing concerns about quackery. For years anti-cancer organizations had warned the public to steer clear of quacks and to seek medical advice from a regular physician as soon as the possibility of cancer was identified. In these warnings, the public was advised that one way to distinguish a quack from a regular physician was his or her attitude towards money: Quacks were more interested in profit than patients. Amid the frenzy of physicians rushing to obtain radium in the 1920s and 1930s, cancer experts feared commercial motivations blurred this distinction, and led to exaggerated medical claims for radium therapy that were indistinguishable from those of quacks. Radium renters, like quacks, undermined patient trust by promising cures that they could not deliver, and risked patients’ lives because they failed to understand the dangers of radium. Physicians pointed to quack cures that killed, like the infamous Radithor,<sup>20</sup> as signifying the dangers of quackery. But it was equally clear that inexperienced regular physicians could, as Quigley put it, cause death and disability.<sup>21</sup>

## The Costs of Radium

The flood of physicians into radium therapy in the 1930s helped set the stage for the NCI’s radium program. Radium was immensely costly, at



one time the most expensive substance in the world, and physicians and medical institutions found it difficult to obtain sufficient amounts of the substance. Thus, while radium imports into the United States jumped dramatically after 1929—it was one of the few commodities not to be affected by the economic downturn, according to the U.S. Department of Commerce<sup>22</sup>—supply did not keep pace with medical demand. A 1931 survey undertaken by the Bureau of Mines estimated that the total radium for medical purposes available in the United States was 124.7 grams, a little over half the quantity the country needed.<sup>23</sup> A 1937 estimate suggests the situation had changed little. A report in the *Washington Post* noted that the United States had 115 grams of radium available for medical purposes, and that a further 125 grams would be needed.<sup>24</sup>

Despite the concerns about price, radium was in fact cheaper in the 1930s than in the late teens and early 1920s, and the price was continuing to fall.<sup>25</sup> Prices had peaked in 1914 when American production of the element began and fell substantially until around 1921, when the Belgians opened new sources of radium in their colony in the Congo. They came to dominate world supply, forcing an end to American production. However, demand for medical radium both in the United States and abroad, outstripped supply, and the rate of fall in price slowed following the beginnings of Congo production. To respond to accusations that they used their monopoly position to hike the price of radium, the Belgian radium suppliers highlighted the fall in prices and also the practical problems of production, for only a very small quantity of radium could be extracted from tons of the ore.<sup>26</sup>

In 1932 the near monopoly of the Belgians came to an end with the opening up of Canadian sources of radium. The rate of fall in the price of radium began to quicken until 1938, when an agreement to divide the world market and stabilize the price at \$40,000 per gram was negotiated between the Belgians and Canadians. The price did in fact rise a little, but the manufacturers' desired price was not attained.<sup>27</sup> By the late 1930s, commentators hoped for further downward pressure on the price of radium from the introduction of high voltage X-ray machines (which produced rays of a similar wavelength to the gamma rays of radium) and from the newly developed cyclotron, a possible source of artificial radiation that might be substituted for radium.<sup>28</sup> The good news of lower prices was,

however, tempered by the economic depression. Thus, while the price of radium dropped, hospitals and practitioners often found they were unable to purchase the substance.

Against this backdrop, the idea that the federal government might be involved in obtaining radium gained political and medical support. Government radium promised to improve supplies, lessen dependence on foreign radium companies, and improve the uneven distribution of radium across the nation. Most radium was concentrated in larger cities and cancer centers, mainly in the East and Mid-West. Many states had only a few milligrams of radium, and some of them had none.<sup>29</sup> There were vast swathes of the country, especially in the West, which had no radium for cancer treatment available within hundreds of miles.<sup>30</sup> Patients in these parts of the country were unlikely to obtain radium therapy without traveling a great distance. For some critics, this suggested that an increase in the supply of radium alone would not solve the problem. A fall in the price might mean that radium would simply go to places that already had a supply, exacerbating the uneven distribution of the element.<sup>31</sup>

But the growing support for federal involvement in the radium issue was not without opposition. Thus, when in 1934 Senator James Davis (R-Pennsylvania) introduced a bill into Congress allowing Belgium to pay \$10,000,000 of its war debt in the form of radium, the surgeon-dominated American Radium Society (ARS) argued against the proposal, concerned that this would give the federal government significant influence over the specialty.<sup>32</sup> This radium was intended for distribution to hospitals and clinics, and, in the ARS view, it threatened to curb private enterprise, raised the spectre of greater federal competition with recognized practitioners, and threatened to exacerbate the problem of inexperienced physicians entering the field. Despite anxieties about the growing numbers of quacks and inexperienced physicians using radium, the ARS preferred professional self-regulation to government regulation. The prospects of federal purchase of radium looked slim.

## The Great Depression and Cancer

Three years later, the situation had changed. With millions of Americans unable to afford cancer services due to the economic depression, with

hospitals and clinics continuing to find it difficult to obtain radium, with cancer mortality surpassing that of tuberculosis in the early 1930s, and with anti-cancer legislative initiatives by progressive Democrats in Congress, opposition to government involvement weakened. The door was opened to a greater role for federal agencies in cancer, and, ultimately, to the federal purchase of radium for therapy.

The door was opened, in part, by a very significant growth in cancer services that created more demand for radium. Encouraged by the American Society for the Control of Cancer (ASCC) and the closely-related American College of Surgeons (ACS), the numbers of cancer clinics began to boom.<sup>33</sup> In the early 1920s there were probably less than fifteen in the entire country.<sup>34</sup> However, following publication in 1930 of the ACS recommendations on standards for cancer services, this number rose dramatically.<sup>35</sup> By 1940 the number of clinics surveyed by the ACS was 490 with 345 approved. (See Table 1.) At the same time, state health departments also began to take a growing interest in cancer. In the 1930s, older control programs such as those in New York and Massachusetts<sup>36</sup> were joined by New Hampshire (1931), followed by Connecticut (1935), by Missouri, Illinois, and Georgia (1937), and by South Carolina and Vermont (1939). As Figure 2 indicates, by the 1940s several other states had the beginnings of an official anti-cancer program.<sup>37</sup>

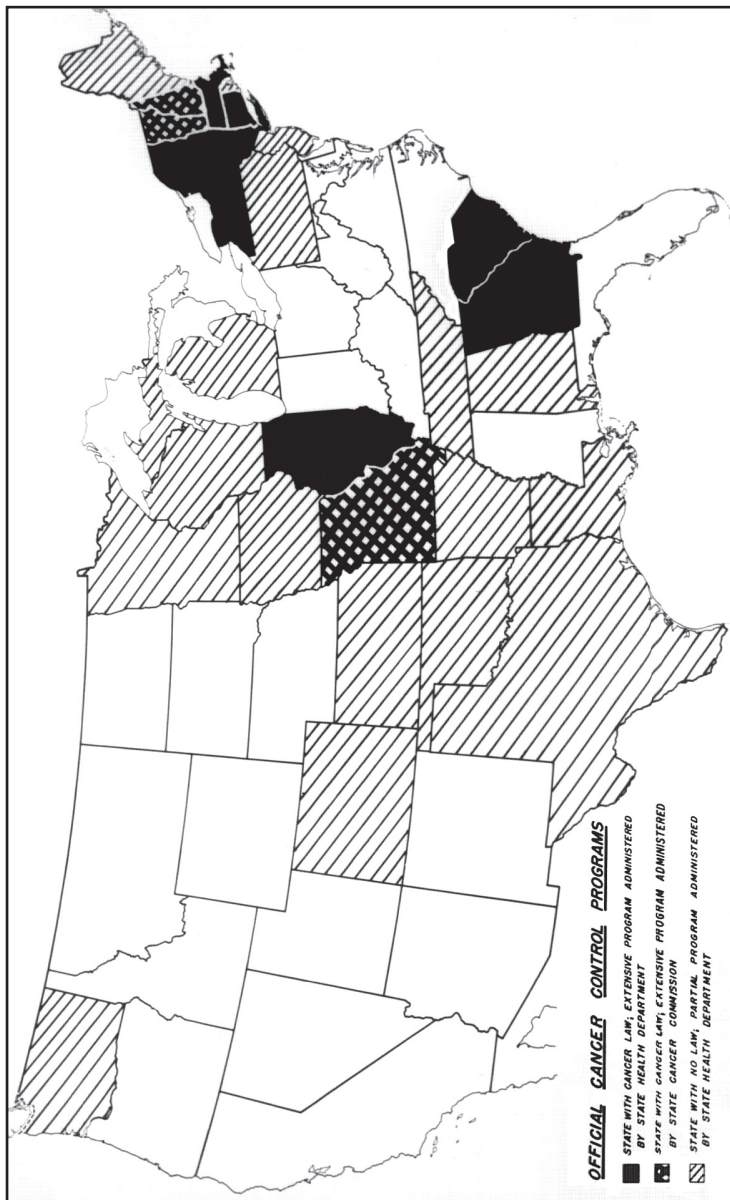
Table 1. Clinics approved and surveyed by the American College of Surgeons, 1933-1940.

Year	Surveyed	Approved
1933	200	140
1934	239	181
1935	250	198
1936	246	210
1937	296	240
1938	332	272
1939	423	307
1940	490	345

Source: See sources listed in Table 2 for approved cancer clinics.

Note: This ACS list surveyed not only American but also Canadian and later a few Chinese and Cuban clinics—these clinics are included in the totals above.

Figure 2. State Cancer Control Programs in 1940.



Source: Carl Voegtlin and R. R. Spencer, "The Federal Cancer Control Program," *Journal of the National Cancer Institute*, 1940, 1: 5.

The burgeoning numbers of cancer clinics and services challenged opposition to the federal purchase of radium. With their budgets strained by hard economic times, many hospitals and state health departments found it very difficult to find the money for radium for such clinics, and so found themselves unable to compete in the frenetic market for the substance. Yet demand for radium continued to rise, fed by various education campaigns that informed the public that the only cure for cancer was early treatment by radium, X-rays, and surgery undertaken by a recognized physician.<sup>38</sup> In these circumstances it was often unclear what hospitals or state health departments should do to obtain radium. Occasionally, they began anti-cancer programs even in the absence of radium, perhaps in part to create political pressure for the substance.<sup>39</sup> But such strategies were risky. The pressure might not work, and patients would be left with nowhere to go, except perhaps to inexperienced physicians and quacks. Thus physicians were often reluctant to undertake campaigns until radium was available.<sup>40</sup> It was a double-bind: the absence of radium created pressure for campaigns to boost supplies, but the campaign could backfire and create demands that cancer programs could not meet.

Against this backdrop of growing anxieties about radium, and with the Belgian war-debt repayment scheme seemingly dead, Congress revisited plans for a cancer bill to authorize federal support for research and treatment. The Public Health Service had supported a small research program on cancer since August 1922, when the Surgeon General had assigned Joseph W. Schereschewsky to study the disease in a rented laboratory in the Department of Preventive Medicine at Harvard Medical School. But efforts to expand PHS support for research had faltered, and bills introduced into Congress in 1927, 1928, 1929 and 1930, did not pass into law.<sup>41</sup> Part of the reason for this failure was a lack of enthusiasm on the part of the PHS. This attitude changed with the appointment in 1936 of Thomas Parran as Surgeon General. As James Patterson notes, Parran had a particular interest in cancer: his wife had died of the disease, he had served on the ASCC, and he had a liberal, activist view of the government's role in public health.<sup>42</sup> The following year, Senator Homer Bone of Washington and Representatives Maury Maverick of Texas and Warren G. Magnuson of Washington, all

progressive Democrats, introduced three cancer bills into Congress.<sup>43</sup> Parran was involved in shaping the Bone and Maverick bills, and perhaps Magnuson's as well.

Unlike the bills in the 1920s, the new bills were not restricted to research. Both Bone and Maverick were anxious to address the problems faced particularly by the poor, and both included the purchase and loan of radium for treatment in their bills. Bone seems to have introduced this measure on the recommendation of Parran, who argued against a broader proposal for a government subsidy to cancer diagnostic and treatment centers. Parran noted that the country was particularly lacking in an adequate supply of radium, that radium was particularly expensive (\$30,000-\$40,000 a gram), and that the country needed sixty to eighty additional grams. In his view, the public authorities were willing to take responsibility for the purchase and loan of radium, but not for the broader subsidy, which would involve considerable public expenditure.<sup>44</sup> Parran also made a case to Maury Maverick for the purchase and loan of radium.<sup>45</sup>

## Political Compromise

The loan program thus entered the legislation as a means of addressing the national shortage of radium, and paradoxically of limiting the role of the newly activist Public Health Service in providing cancer services. But this still leaves one question: Why did the loan program constitute such a large percentage of the NCI's budget when a major justification for the creation of the NCI was that of research? The answer, I suggest, was the low status of cancer research as a field, and the inability of scientists to persuade Congress that the long-term benefits of laboratory research should win out over the immediate benefits of distributing radium.

Those who argued for federal support for cancer research often highlighted the poor status of the field in the country. It was, they claimed, undervalued. Philanthropic resources were insufficient to support cancer research, and there were not enough trained investigators in the field.<sup>46</sup> Pay was poor. The average wage of a cancer researcher with two to five years of experience was about that of a carpenter, and people were easily tempted by the better pay and prospects in industry. Moreover, the field

was so technically complex, and the prospects of scientific advance so uncertain, that it was very unlikely a cancer researcher could make a name for himself or herself, and, even if he or she did, there was little in the way of a career structure by which they might advance. In 1932, Henry Sigerist, recently appointed to head the Institute of the History of Medicine at the Johns Hopkins University, recalled a German surgeon telling him: "If a great scientist at the end of a brilliant career wants to make a fool of himself, he takes up the problem of cancer."<sup>47</sup>

It was such problems that made cancer researchers particularly vociferous in their appeals for federal funding, but the problems also reveal the weakness of the researchers' position. By their own admission they could not promise results in terms of improvements in treatment for years, if ever, and so it was often quite unclear why, if federal money should be spent on cancer at all, it should not go to something like radium which promised immediate results in terms of relieving suffering. Put another way, part of the reason why research was not the main focus of the NCI was that its advocates were unable to promise results that might help already existing cancer patients. Improving cancer treatment for these patients had better political appeal in congress than nebulous promises of the future benefits of research.

Pleas for greater federal research funding were not helped by disputes among cancer experts over the value of fundamental research. For example, James Ewing argued in 1936 that in the past thirty years the major benefits to the cancer patient had come not from fundamental laboratory work, but from clinical research. Indeed, Ewing complained that the promotion of fundamental cancer research was sometimes carried out at the expense of practical steps to help patients: "the first step [he wrote] in the organization of cancer control in any community should be the provision of first-class clinical service, under cover of which one may pursue at his leisure, and without reproach, any number of interesting fundamental researches."<sup>48</sup> It was for this reason that, in evidence to a Joint Committee of Congress, he opposed the idea of federal support for research as: "merely another futile effort to discover the ultimate cause of cancer, which is an unsolvable problem."<sup>49</sup> Instead, he argued for the creation of a large central cancer institute in Washington designed mainly for the treatment of patients.<sup>50</sup>

As one of the most influential voices in cancer research, Ewing's criticism carried weight. With Bone and Maverick keen to do something for current cancer patients, and the American Medical Association (AMA) cautioning against federal government support for research on the grounds that it might paralyze private initiative,<sup>51</sup> Congress found that research alone was an insufficient political ground to support arguments for the federal funding of cancer. Attention, therefore, focused on measures that might have a quicker impact than fundamental research. The prospect was worrying to supporters of laboratory research. "I hope that the treatment feature will not be neglected," noted Clarence Little, then in the midst of his campaign to promote a New Deal for mice, in evidence to the Joint Committee, "but I hope also that it will not be overemphasized to a point where the pure research suffers, because the very scattered nature of that pure research makes it a very poor beggar, a very poor agent, to raise funds for itself."<sup>52</sup>

Ewing's proposal of a cancer treatment center seems to have persuaded some members of Congress. Thomas Parran noted later that Congress wanted to do something for the existing cancer patient. The specific proposal, he suggested, was that the Cancer Institute should be a central government cancer hospital. But Parran added ambiguously that the "implications of it were rather frightening,"<sup>53</sup> and, as a result, the law was drafted to authorize the purchase and loan of radium. This was a better means, he claimed, of treating people in institutions where radium was needed, and of developing improved methods for the use of radium. Parran did not elaborate what these frightening implications were, but it is likely that he felt the PHS would be reluctant to take responsibility for this hospital, just as he had noted earlier it would have been reluctant to take responsibility for a subsidy for cancer diagnostic and treatment services. It is also probable that politically powerful medical organizations such as the American Medical Association (AMA) and the ARS were opposed to proposals for a cancer hospital (as they would also have been opposed to the subsidy proposal) as an intrusion by the federal government into health provision.

The radium loan program, therefore, gained support in part as a political compromise. First, it promised to address Congress's desire to do something for present-day cancer patients (especially patients that could



not afford care during the Depression) while avoiding a broader subsidy of diagnostic and treatment services or the creation of the hospital that Ewing desired.<sup>54</sup> Second, it also smoothed the path to congressional support for research. Despite anxieties that they might suffer if the Cancer Act supported treatment programs, cancer researchers gained Congress's backing as part of a mixed legislative package that included both research and treatment. It was the combination of the promise of long-term benefits from research and short-term benefits from radium that made the Cancer Act politically workable.<sup>55</sup>

Paradoxically, this mix of research and treatment may have put an end to an earlier idea that the radium might be used primarily for research. In circa 1936/1937, Schereschewsky had drawn up a memorandum that proposed a combined cancer research and treatment center, equipped with between eight and ten grams of radium.<sup>56</sup> But the loan program did away with this possibility of combining research and practice. (Perhaps it was too close to Ewing's suggestion of a cancer treatment hospital.) It also did away with another possibility that radium might be used for cooperative research among several institutions. Early plans for federal radium proposed to loan the salt to hospitals, research centers, and institutions across the country, not for routine therapy alone, but also for collaborative research—radium recipients would be required to join in research problems and cooperate with a cancer center in certain clinical problems.<sup>57</sup> While the 1937 Act allowed for the radium to be used for research, in practice only a tiny amount was used in this way.<sup>58</sup> Against a backdrop of concern that radium therapy was being sacrificed to research, the vast bulk of the radium went to routine therapy.<sup>59</sup>

## The Radium Loan Program

The radium loan program might have begun life as a political compromise, but the NCI administrators who ran it saw it as much more. In their view, the program promised not only to improve the nation's supply of radium, but also to rationalize its distribution. It would coordinate federal, state and local anti-cancer programs, and ensure that only experienced or qualified individuals obtained government radium. In short, it promised to ensure that best-practice filtered down from leading centers,

through to clinics and hospitals in far-flung corners of the country. NCI administrators also hoped to be able to use the government's purchasing power to obtain radium at lower than commercial price, and there was debate as to whether the NCI should put the purchase off until the price had fallen further.<sup>60</sup> In fact, following the government's acquisition of radium, the price rose, and the radium companies and the National Bureau of Standards began to predict further increases in the price of radium, in part because of increasing demand for the element, and because of the Belgian-Canadian agreement previously mentioned.<sup>61</sup> Rising prices prompted some to see the NCI not as a source of radium, but as a potential purchaser of their own surplus radium.<sup>62</sup>

The first loan was made to Sedgwick County Hospital, Wichita, Kansas, on 6 October 1938, and by 1940, 47 hospitals in 24 states and Hawaii had received radium.<sup>63</sup> The number had jumped to about 57 in 1943 (see Table 2 at pp. 121-24), not including the Marine Hospital in Baltimore to which the NCI allocated two grams of radium for a radon production plant.<sup>64</sup> As the name suggests, the program was a loan program. Hospitals that received radium were not given the radium; it remained the property of the NCI, and hospitals had to reapply each year to keep the radium on loan to them.<sup>65</sup> The NCI itself did not charge for the loan: hospitals that received radium agreed to obtain insurance for it, and not to charge their patients for its use, excepting some related nursing and medical costs. Occasionally, the NCI would visit the various hospitals for routine checks of the tumor clinics and the radium.<sup>66</sup> It also visited clinics to follow up complaints of poor practice. One such visit was in 1940 to the Sedgwick County Hospital.<sup>67</sup>

The vast bulk of the radium went not to elite cancer institutions, but to small city, county, and private hospitals, as well as to a sprinkling of university hospitals providing care for indigents.<sup>68</sup> Most of the hospitals that received radium were in the East, the South and the Mid-West (See Figure 3). Few hospitals west of Wichita received radium, excepting loans to Denver's Colorado General and St Luke's Hospitals, El Paso's City-County Hospital, Seattle's Swedish Hospital, the City County Hospital in Los Angeles, and the Queen's Hospital in Hawaii. If the program was intended to improve the distribution of radium throughout the country, it did not succeed. Although the loan program was an



important element in state cancer control programs, many areas especially in the West remained without adequate medical radium.

As Table 2 indicates many hospitals that received radium between 1938 and 1943 had established tumor clinics in the 1930s, a significant number being formed in 1937/1939 shortly before the first loans of radium were sent out. As has been noted, creating cancer clinics could be an expensive undertaking because of the need to purchase X-ray, radium and laboratory equipment. Not all hospitals could obtain sufficient radium, and some could obtain none. Hospitals without radium had to send patients elsewhere for treatment,<sup>69</sup> or return them home,<sup>70</sup> and the absence of radium or X-ray equipment jeopardized recognition by the American College of Surgeons, which specified that tumor clinics must be equipped to properly treat patients with radium and X-rays.<sup>71</sup> Hospital administrators and physicians thus saw government radium as a way of easing the financial burden, expanding the range of services available for patients, and gaining ACS recognition.<sup>72</sup> Recognition by the ACS was not a prerequisite for an NCI loan. Eight hospitals did not have ACS-approved clinics prior to 1943, and others only obtained recognition after the loan was made (see Table 2).<sup>73</sup>

This is not to say that government radium was an unequivocal boon. The arrival of government radium was often reported in the local press, with the result that hospitals and clinics would suddenly find themselves inundated with new patients.<sup>74</sup> Growing numbers of patients could signify a welcome growth of public and medical awareness of the cancer problem.<sup>75</sup> But it also created demands for cancer services that hospital administrators and physicians feared they would be unable to meet. This could be a never-ending problem, with the acquisition of radium stimulating a new flow of patients, in turn creating demands for more radium and other cancer services, in turn promoting delay. Thus, the free radium from the NCI could be a temporary fix, and one that came with strings (such as particular qualifications of radium therapists) that hospitals could find difficult to meet.<sup>76</sup> But, despite these problems, hospital administrators were not reluctant to seek NCI radium, and demand rapidly outstripped supply.

If hospital administrators saw NCI radium as a means of improving cancer services, so too did state health administrators. Federal radium was

an integral part of state cancer control programs established between 1937 and 1939, including those of Connecticut,<sup>77</sup> Missouri,<sup>78</sup> Georgia,<sup>79</sup> South Carolina,<sup>80</sup> and Vermont,<sup>81</sup> as well as older ones such as those of New York and Massachusetts. Like their hospital counterparts, state officials saw radium as a useful means of ensuring that cancer clinics were provided with a full range of therapeutic equipment.<sup>82</sup> The failure of some hospitals to secure government radium meant delay in establishing diagnostic or treatment clinics, and endangered these nascent state anti-cancer schemes. The director of the Georgia Department of Public Health made the point in 1938, fearful that one hospital's failure to secure government radium would undermine his efforts to establish a network of cancer centers across the state: "undue delay [he wrote to the NIH] in supplying this radium will materially affect the organization of additional treatment centers which we are endeavoring to establish in this State."<sup>83</sup> At first, each applicant hospital was required to have the approval of the official state boards of health and cancer commissions, where the latter existed.<sup>84</sup>

One Georgian state official argued that the growing importance of cancer as a public health issue meant that they were the ones most familiar with existing facilities in their states and best suited to judge where additional facilities should be established.<sup>85</sup> The point was endorsed by the NACC, which also hoped it would cement existing cooperative relations between the state health departments and the United States Public Health Service, and solve the practical problems of assessing the suitability of individual hospitals for a loan. The NACC wanted to ensure that loans were part of a coordinated effort by the state to deal with the cancer problem, and counter what Clarence Little saw as "immediate condemnation [from medical "men"] of even the idea that we should loan radium to any individual institutions."<sup>86</sup> But it was only a short term solution. Only a few state health departments had well-organized cancer control programs, and only a few of these included radiation therapy. One NCI official later noted that in consequence the requirement did not have a significant impact on the program.<sup>87</sup> The requirement for state approval was later dropped following the addition of qualified radiologists to the NCI's staff who served as consultants and advisors to the loan program, and with the growth of approval procedures by the various radiology organizations.<sup>88</sup>

In addition to the requirement for state approval, the NCI stipulated that only those with qualifications equivalent to those required for diplomates of the American Board of Radiology (incorporated in 1934) would be allowed to use the radium for treatment. “This is the highest standard that we know of in this country,” explained Carl Voegtlin, the chief of the NCI, who went on to elaborate a legal rationale as well: “and it was adopted in order to protect ourselves against the possibility of lawsuits by persons who might be injured as the result of improper radium therapy.”<sup>89</sup> However, Schereschewsky (who had now moved from Harvard to Georgia, where he was the acting director of cancer control for the state) worried that this recommendation might work against efforts to ensure that the radium was distributed to places that did not have it. In his view, the American Board of Radiology’s qualifications were so strict that the creation of some outlying centers without such qualified radiologists would be unduly delayed, and would, as he put it, “seriously cripple cancer treatment facilities in the State.”<sup>90</sup> By 1962, seven institutions had been denied a loan because their radiologists did not meet the qualifications of the Board.<sup>91</sup>

These issues highlight tensions between federal and state administrators over the radium loan program. The program might have begun as an effort to cement cooperative arrangements, but sometimes federal and state officials did not cooperate. Federal officials found state officials questioning how they ran the program. These officials queried federal decisions by which hospitals received or did not receive radium; federal decisions on the qualifications required of radium practitioners; and the federal decision that only indigent patients should receive government radium. Georgia makes the case again. The Georgian control scheme aimed to make cancer clinics available for both private and state-aided patients, and Georgian officials worried that federal rules dictated that, even where there was no other radium locally, paying patients would not be allowed to use NCI radium. Therefore they would be required to travel a considerable distance for treatment—a requirement that would probably result in delayed treatment.<sup>92</sup> The NCI’s response is not recorded, but it does not seem to have changed its rules.

We do not know much about the technical use of radium: few records on this subject appear to have survived. However, the quantity of radium

purchased by the NCI placed restrictions on the type of therapy that could be undertaken. Most radium was allocated in small milligram quantities, packed into standardized tubes and needles, apart from the two grams given to the Marine Hospital in Baltimore for radon production. Despite considerable discussion on the NACC, the Council decided not to allocate radium for telecurie or bomb therapy, the major technological innovation of the 1930s.<sup>93</sup> This required several grams of radium to produce a beam of radiation, and the NCI simply did not have enough to distribute for this purpose; not the eight to ten grams that Schereschewsky had requested for the proposed cancer research hospital, which would have been sufficient for a bomb.

Radium bombs would have tied up too much radium to allow the NCI to make the element widely available. Moreover, despite considerable enthusiasm for bomb therapy in Europe it was still regarded as an experimental technique on the American side of the Atlantic, and its superiority to newer supervoltage X-ray equipment was questioned, since the latter produced X-rays of similar wavelength to the gamma rays of radium. "The best testimony that Congress had," Thomas Parran told the NACC in answer to a question about the intention of Congress, "was that there was a deficiency in the amount of radium, that radium was a valuable agent for the treatment of cancer, and that more radium would save the lives of some patients. You would not be doing that in the next year whilst experimenting with the radium bombbs [sic], and there is a likelihood that in two or three years from now the price will be lower."<sup>94</sup>

Second, if the quantity of radium purchased by the NCI placed restrictions on the types of therapy that could be carried out, it also restricted the ways in which the NCI could influence the development of radiotherapy as a specialty. Comparison with the British system of radium distribution is worth mention here. The establishment in 1929 in Britain of a centralized national radium organization had resulted in the creation of one of the world's largest radium purchasing and supply organizations—the Radium Trust which purchased radium, and the Radium Commission which distributed it to hospitals. In 1931 the Trust ordered 24.9 grams of radium, and later obtained a further 20 grams on loan, with the option of purchase; quantities that dwarfed the 9.5 grams of radium purchased by the NCI for a much larger nation.<sup>95</sup> The

Commission used its control of radium to encourage the separation of radiotherapy from radio-diagnosis (this did not happen in the United States until the 1960s); to encourage the development of bomb therapy; to forge a common union between radium therapy and X-ray therapy, hitherto often quite separate specialties; and to make hospitals that wanted its radium appoint physicists, and adopt certain safety and practice standards.<sup>96</sup> The NCI quickly realized that it could not hope to emulate these efforts. After receiving a report on the British Radium Commission, the director of the NIH was moved to note in 1938: “the English are ahead of us in the development of a national plan for cancer control as far as the government is concerned.”<sup>97</sup>

## The End of a New Deal for Patients

The radium loan program began in 1938 with high hopes of a new future for radium therapy within the NCI. Indeed, at one time the prospect was that similar sums would be spent on radium in future years. The *Washington Post* reported in 1937 that the plan was for the federal government to spend \$1,000,000 over a period of five years: ten grams a year at \$20,000 a gram (less than Parran’s estimated cost of the previous year) until the supply was increased to 50 grams.<sup>98</sup> But this plan never came about. Nineteen thirty-eight was the only year in which the use of radium constituted such a large part of the NCI’s budget,<sup>99</sup> and while expenditure on cancer research boomed during the 1940s, the radium loan program soon disappeared from view, its budget so small that it barely figures in the NCI’s accounts after 1940. All it cost was the salary of a part-time administrator, and \$2,000 per annum which was transferred to the National Bureau of Standards to check the radium containers.

So why did it end? Part of the reason was the opposition of cancer researchers like Little, who saw in the radium program a danger that “their” institute might be turned into a treatment program for the poor.<sup>100</sup> It will be recalled that research alone had been insufficient justification for the creation of the NCI, and that researchers had piggy-backed on the appeal of radium therapy in Congress to get the 1937 Act passed. But having benefited politically from radium therapy, they now attempted to do away with it through the NACC: a body “seriously criticized for being



made up of non-medical men on the one hand and pathologists on the other,”<sup>101</sup> as one NACC member noted. The initial efforts of its members, however, seem to have gone nowhere. At one point in its second meeting, the NACC tried to reduce the cost of the radium purchase to \$10,000, prompting one later commentator to note: “Either it had not been made clear or the council lost sight of the fact that \$200,000 of the Institute’s appropriation for that year had to be spent for radium, or else not spent at all.”<sup>102</sup>

Early efforts to get rid of the radium loan program might have been ineffective, but critics soon picked up on a broader anxiety about the program. Physicians and researchers had accepted the creation of the program as an alternative to even more worrying prospects, such as the creation of a federally funded cancer hospital or of a subsidy for diagnostic and treatment services, but, as soon as these problems were out of the way, critics began to focus attention on the radium program itself, fearful that this too might be the thin end of the wedge of socialized medicine. The *Washington Post’s* suggestion that by 1942 the NCI might have about 50 grams of the element, would have given the institute enormous power over the development of radium therapy in the United States, and perhaps of cancer services more generally. Physicians could look across the Atlantic to Britain, where a government-controlled radium organization had effectively reshaped cancer services in that country by means of its control of a vast proportion of the nation’s radium. American physicians were not enamored of the prospect of similar developments in the United States.

The opportunity to stop such a prospect came about with concerns that there were not enough hospitals and specialists that met the standards of equipment and skill set out by the NCI for a radium loan.<sup>103</sup> The result was that the NACC quickly agreed not to purchase any more radium in future years, and to focus attention instead on the question of medical training and education. To address this issue, the NACC appointed a committee on education, which met for the first time in January 1938, and effectively marked the beginning of the end of plans to expand the radium loan program. Schereschewsky’s concerns that the high standards required of radium practitioners might undermine state efforts to obtain radium had come about, albeit not perhaps in the way he had anticipated.

The discussions that followed as recorded in the verbatim minutes of this committee show how questions of technical competency in the use of radium were intertwined with anxieties about the prospect of state medicine, the nature of specialization in cancer research, and the appropriate role of the federal government in cancer. While most speakers were willing to accept a role for the federal government in training physicians, they expressed deep misgivings about the prospect of state medicine, and about the impact of the federal government on the direction of medical specialization. The debate drifted off into a detailed discussion of training in cancer and the role of the federal government in this, laying the foundations of a new NCI program of clinical training in cancer.<sup>104</sup>

The NACC might have agreed not to purchase radium in future years, but this still left the question of what to do about the \$200,000 appropriated for 1938. NACC opinion was a mix of political reluctance to support the loan program, and practical fears that the small hospitals to which they proposed to loan the radium would not have the staff or facilities to handle it safely and effectively. The result was that the NCI put off the purchase of radium while it worked out how to distribute the element, and determine whether it could ensure its competent and safe use. Ironically, this delay led to a belated and somewhat reluctant support for the loan program as members calculated the political costs of not spending money on a project in which Congress was particularly interested. As one of the opponents of the radium program, Clarence Little, noted, there was a risk that the failure to purchase might endanger congressional support for other projects. "We have to depend on a certain amount of good will on the part of the Congress of the United States if the projects we have already started are to be continued let alone an expansion program,"<sup>105</sup> he noted with reference to plans to expand training and research.

Political calculations also ensured that the NACC continued to ask Congress for money for radium long after it had decided not to expand the program. The problem was, as the director of the NIH, Lewis R. Thompson, put it, that the budget line might disappear if they did not ask for money for radium. The purchase of radium had been in the first year's appropriation for the NCI, and if it was not included in subsequent years, the risk was that Congress might take away the money. Thompson

explained: “The thing that occurs to them [members of Congress] always is, if you are not going to buy \$100,000 worth of radium, let us take it off your appropriation.”<sup>106</sup> This quandary put some members of the NACC into a difficult position. They did not want to lose the money, but they also worried, as Clarence Little put it, that a request for more money for radium “would open the doors to unnecessary political pressure which none of us wants.”<sup>107</sup> The NCI had received more applications for radium than it could fill, and Congress was more interested in present cancer patients than in research. Little feared that the request for radium threatened plans to expand research funding.<sup>108</sup>

The consequence was an extended discussion on the NACC on how to include radium in the funding request to Congress in such a way as to allow the institute to spend the money on other projects. Any last hopes that the radium program might expand disappeared in this convoluted budgetary debate. A mix of medical and scientific opposition to government provision of cancer services, anxieties about the capacity of physicians to use government radium safely and effectively, and some deft political maneuvering, had destroyed hopes of using the resources of the federal government to help indigent cancer patients. Never again would such a large percentage of the NCI’s budget be devoted to providing routine treatment. Instead, the NCI shifted resources to research and training. A different vision of the New Deal had won out. The vision of the NCI as providing free health care for the poor was dead.

## Epilogue

What happened to the radium loan program? The vision of the NCI as providing free health care for the poor might have died in 1938, but the radium program did not die with it. Indeed, the number of radium loans increased to average between 52 and 54 hospitals per year for much of the early 1950s—this without any additional radium purchases. A 1962 report noted that between 1938 and 1962, the NCI received 114 applications for radium loans, from 109 institutions or hospitals, 75 of which were approved and 34 were not approved. Five additional loans were made to groups in the Public Health Service, one to a hospital and the remaining four to groups for research purposes.<sup>109</sup> We know the names of only

two hospitals that were rejected, and of only 68 of the 75 hospitals that received radium.<sup>110</sup>

Despite the increase in loans, after 1940 the NCI gave little attention to the program beyond its routine administration. There were brief discussions of the program on the NACC in 1942 after Pearl Harbor (it was feared that enemy bombing might disperse the radium),<sup>111</sup> and in 1944 following the inclusion of the NCI into the NIH under the Public Health Service Act (it was feared the loan program might not be legal under an act that did not appear to allow for a treatment program: Lawyers confirmed that the program was legal).<sup>112</sup> In July 1947 the loan program—originally run from the NCI's Office of the Director—was transferred to the newly created Cancer Control Branch of the NCI, later renamed the Field Investigations and Demonstrations Branch.<sup>113</sup>

After 1947 the program continued quietly until the late 1950s, when the NCI became concerned about poor safety standards in many hospitals receiving radium.<sup>114</sup> The problem was not new. There had been concern about this issue in 1940 when a survey highlighted “rather startling” levels of radiation exposure in cancer clinics,<sup>115</sup> but the news was new to John Heller, the director of the NCI in the late 1950s. Fearful that the NCI would be criticized for not ensuring the safe use of the radium, Heller appointed an advisory committee to view the future of the program, which led to the radium being recalled, repackaged, and loaned out again under tighter rules.<sup>116</sup> Heller's successor, Kenneth Endicott (1960-1969), wanted to close the program down.<sup>117</sup> But, instead, in January 1961 he appointed a new committee to recommend standards for the allocation of radium, while in June 1961 another committee prepared a “Guide for Protection Against Radiations from Radium in Storage, Use, and Handling.”<sup>118</sup> In part because of the tighter rules (and perhaps because now the NCI discovered it only had seven rather than nine and a half grams), the number of hospitals using radium seems to have dropped from 54/55 to about 45.<sup>119</sup>

After this flurry of interest, the program quietly disappeared from attention again. The last record I have of its existence is in 1966, so it probably came to an end in the late 1960s or 1970s.<sup>120</sup> We may never know precisely when it ended. The files were destroyed in 1988.<sup>121</sup>

Table 2. Hospitals receiving radium from the NCI, 1938-1943.

State	Institution	Location	Tumor Clinic Approved by ACS	Tumor Clinic Founded	Comments
Maryland/D.C.	NCI and the United States Marine Hospital	Washington and Baltimore	1941	c.1939 <sup>122</sup>	(2 grams) Radium for the production of radon, and for research. <sup>123</sup>
State	Institution	Location	Tumor Clinic Approved by ACS	Tumor Clinic Founded	Comments
Alabama	Hillman Hospital†	Birmingham	1940-	TC:c. 1940. <sup>124</sup>	
California	Los Angeles County General Hospital*†	Los Angeles	1935-		
Colorado	Colorado General Hospital University of Colorado (Bonfils Foundation Tumor Clinic)*†	Denver	1934-1937-	CC: 1926 <sup>125</sup> TC: 1937 <sup>126</sup>	
		St. Luke's Hospital*† <sup>127</sup>	Denver	1933-	CC: 1931? <sup>128</sup>
Connecticut	Danbury Hospital*†	Danbury			In existence in 1939
	Grace Hospital*†	New Haven	1937-		In existence in 1935
	New Britain General Hospital†	New Britain	1939-		TC:1939 <sup>129</sup>
	Norwalk General Hospital*†	Norwalk	1940-		TCConf:1934 <sup>130</sup>
	St. Francis Hospital*† <sup>131</sup>	Hartford	1933-		TG: 1935 <sup>132</sup>
	Stamford Hospital*†	Stamford	1940-		TC: 1938 <sup>133</sup>
Georgia	City-County Hospital*†	LaGrange	1942-		CC:1938 <sup>134</sup>
	University Hospital?*	Augusta	1936-		
	Emory University Hospital†	Atlanta	1938-		CC?: 1937 <sup>135</sup>
Territory of Hawaii	The Queen's Hospital*† <sup>136</sup>	Honolulu	1941-		CC: 1931 <sup>137</sup>
Illinois	Cook County Hospital†	Chicago	1933-4 1941-		TC: 1938 <sup>138</sup>
Indiana	Indianapolis City Hospital† <sup>139</sup>	Indianapolis	1936-		CC&W: 1938 <sup>140</sup>
	Protestant Deaconess Hospital†	Evansville	1941-		CI: 1939 <sup>141</sup>
Iowa	Broadlawns General Hospital†	Des Moines	1939-		
Kansas	Sedgwick County Hospital and Clinic*† <sup>142</sup>	Wichita	1939-40 (D) 1941-		TC/CC: 1937 <sup>143</sup>
Kentucky	Norton Memorial Infirmary*†	Louisville	1933-		TC: 1932 <sup>144</sup>
	St. Joseph's Infirmary†	Louisville	1933-		TC: 1932. <sup>145</sup>
Louisiana	Shreveport Charity Hospital*† <sup>146</sup>	Shreveport	1933-		TC: 1932
Maryland	Johns Hopkins Hospital*† <sup>147</sup>	Baltimore	1939 (D) 1939- <sup>148</sup>		
	University of Maryland Hospital*†	Baltimore	1933		OlC: 1930 <sup>149</sup>

Table 2. Hospitals receiving radium from the NCI, 1938-1943 (continued).

State	Institution	Location	Tumor Clinic Approved by ACS	Tumor Clinic Founded
Massachusetts	Worcester City Hospital†	Worcester	1934-5 1941-	TC: 1939 <sup>150</sup>
Michigan	Mercy Hall Cancer Hospital†	Detroit		
	Receiving Hospital†	Detroit	1935-6 (D) 1937-	
	University of Michigan Hospital*†	Ann Arbor	1933-	
Missouri	Barnard Free Skin and Cancer Hospital*† <sup>151</sup>	St. Louis	1933-39 1940- (H)	
	Kansas City Municipal Hospital*† <sup>152</sup>	Kansas City	1936-	CC: 1938 <sup>153</sup>
	Missouri Cancer Commission for the Ellis Fischel State Cancer Hospital*† <sup>154</sup>	Columbia	1940- (H)	Cancer Hospital opened 1940
	Fulton State Hospital*† <sup>155</sup>	Fulton	1934-8 (D) 1939	TC/CC: 1933 <sup>156</sup> Beds 1935/6 <sup>157</sup>
Nebraska	University of Nebraska Hospital*†	Omaha	1938-	TC founded between 1935 & 1940
New Jersey	Newark Beth Israel Hospital*†	Newark	1933-	1929 <sup>158</sup>
	Newark City Hospital*† <sup>159</sup>	Newark		1939/40 radiotherapy department.
New York	Albany Hospital*† <sup>160</sup>	Albany	1938-	
	Binghamton Hospital*†	Binghamton	1937-	
	Vassar Brothers Hospital*† (Duchess County Tumor Clinic)	Poughkeepsie	1939-	TC: 1939 <sup>161</sup>
	Meadowbrook Hospital*†	Hempstead	1935-	TC: 1937 <sup>162</sup>
	Strong Memorial Hospital (University of Rochester)*† <sup>163</sup>	Rochester	1933-	TC: c1930/1 <sup>164</sup>
North Carolina	Charlotte Memorial Hospital†	Charlotte		
	Duke University Hospital*†	Durham	1939-	TC: 1935 <sup>165</sup>
	North Carolina Baptist Hospital† <sup>166</sup>	Winston-Salem		TC: 1944 <sup>167</sup>
Pennsylvania	Elizabeth Steel Magee Hospital†	Pittsburgh	1940-	
	Misericordia Hospital*† <sup>168</sup>	Philadelphia		Clinic planned 1933 <sup>169</sup>
South Carolina	Greenville General Hospital†	Greenville		TC:c. 1939/40 <sup>170</sup>
	Tri-County Hospital†	Orangeburg		
Tennessee	The Baroness Erlanger Hospital*†	Chattanooga	1940-	?TC:1922 <sup>171</sup> CC:1940 <sup>172</sup>
	Nashville General Hospital*†	Nashville	1941-	TC: 1940 <sup>173</sup>

Table 2. Hospitals receiving radium from the NCI, 1938-1943 (continued).

State	Institution	Location	Tumor Clinic Approved by ACS	Tumor Clinic Founded
Texas	Baylor University Hospital†	Dallas	1933-1942	TC: 1931 <sup>174</sup>
	El Paso City-County Hospital† (El Paso Country Medical Society Tumor Clinic)	El Paso	1940-	Unknown
Vermont	Mary Fletcher Hospital <sup>†175</sup>	Burlington	1939 (D)	TC: 1939 <sup>176</sup>
	Vermont State Cancer Commission for Use at the Rutland Hospital and the X-ray and Radium Institute <sup>†177</sup>	Rutland	1940-	TC: 1939 <sup>178</sup>
Virginia	Medical College of Virginia* <sup>†179</sup>	Richmond	1937-	1937 a TC "in its infancy" <sup>180</sup> in existence. TC: 1939 <sup>181</sup>
	University of Virginia Tumor Clinict	Charlottesville	1934-	
Washington	Swedish Hospital* <sup>†182</sup>	Seattle	1933-	Tl:c1932 <sup>183</sup>
West Virginia	Mountain State Memorial Hospital†	Charleston	1933-	TC/CC: 1934 <sup>184</sup>

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## Radium Loans:

## Sources

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\* = hospitals recommended for loan in 1939 as listed in this article.
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– Marshino notes that 55 loans were made during this period and that 49 were in effect on 30 June 1943. My own calculation is that 57 loans were made, not including the loan to the Baltimore Marine Hospital.  
† = hospitals which had received radium to 1943 as listed in this article.
- Endnotes.

## ACS-Approved Clinics:

## Sources:

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Note: This column lists the date of first approval from 1933 (when the ACS issued its first list of approved clinics) to 1943 or earlier. Some clinics are approved and later removed from the list, hence multiple dates. A blank entry means that no ACS approved clinic existed at that institution from 1933 to 1943. The ACS also included a category of "provisionally approved" clinics—these are included here, but are not identified.

**Tumor Clinic Founded:**

**Sources:** See endnotes.

**Notes:** This column lists the dates the tumor clinic was founded, if known. Some hospitals were serial founders of clinics; hence the multiple entries. Also, because records of the creation of all clinics have not been identified, there are some discrepancies between the dates in this column and the dates of approval. For example, Worcester City Hospital had an approved clinic before the founding of what must have been a new clinic in 1939.

**Abbreviations:**

TC= Tumor Clinic, Olc= Oncological Clinic, CC = Cancer Clinic, TI = Tumor Institute,  
CI = Cancer Institute, CW = Cancer Ward, TG = Tumor Group, TConf = Tumor conference.

D – Approved as a diagnostic clinic

H – Approved as a cancer hospital

The Johns Hopkins University was approved as an institution in which departments were carrying out approved cancer clinics.

## Notes

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*Note on sources:* The NCI's archives are split in several sites, and the following abbreviations are used: NCI archives (refers to archives listed in the NCI's LION database); NCI records (refers to archives obtained through the records managers, Ressa Nichols and Karen Hubbard); National Archives (refers to NCI archives held at the National Archives at College Park). The creation of a cancer clinic and the arrival of government radium were often reported in local papers. I relied on newspaper clippings files maintained by local city and county libraries and some hospitals and university centers to identify these reports, and most newspaper citations are from these files. Newspapers are generally cited by the name and date that is given in the clippings file, for example the St. Louis *Globe-Democrat*, is listed here as the St. Louis *Globe*. The libraries from which the clippings are taken are generally not cited here unless they are non-local.



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3. 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, Maryland.: Division of Cancer Control and Rehabilitation, National Cancer Institute; Dept. of Health, Education, and Welfare, Public Health Service, National Institutes of Health, 1977). The bills that eventually formed the Cancer Act also prioritized research—see U.S. Congress, Senate, *Cancer Research: Joint Hearings Before a Subcommittee of the Committee on Commerce, Senate and Subcommittee of the Committee on Interstate and Foreign Commerce*, Senate and Subcommittee of the Committee on Interstate and Foreign Commerce, 75th Congress, 1st Session, 8 July 1937 (Washington, D.C.: U.S. Government Printing Office, 1937), pp. 2-6.
4. Stephen P. Strickland, *Politics, Science and Dread Disease: A Short History of United States Medical Research Policy* (Cambridge, Massachusetts: Harvard University Press, 1972), chap. 1.
5. The wording of the item in the deficiency appropriation act covering the institute's appropriation (H. R. 8245) was as follows: "National Cancer Institute: For carrying into effect the provisions of section 7 (b) of the National Cancer Institute Act, approved August 5, 1937, fiscal year 1938, \$400,000, of which \$200,000 shall be available for the purchase of radium." In 1937, the director of the NIH estimated that expenditure for 1938 would be:

Expenses of the National Advisory Cancer Council		\$ 10,750
Pulmonary cancer study		27,000
Purchase of radium and X-ray equipment		220,250*
Miscellaneous comprising:		
Est. San Antonio (Jackson)	\$ 4,000	
Est. Baltimore (Gey)	6,000	
Pub. Health Methods	33,330	
All other expenses	96,670	
(including grants-in-aid, training of specialists, and fellowships)		
Total miscellaneous	\$140,000	140,000
<b>Total</b>		<b>\$400,000</b>

\*\$22,250 for X-ray equipment

- L. R. Thompson, "Memorandum for the Executive Director, National Advisory Cancer Council," 5 November 1937, AR-3711-000030, NCI archives. It should be noted that the Cancer Act also authorized an appropriation of \$750,000 for building and equipping the NCI building in Bethesda, but this was a one-off appropriation. H.R. 8245 was the first of the annual appropriations for support of the NCI's activities. A copy of the act is in AR003910, NCI archives.
6. Noka B. Hon, "National Cancer Institute Radium Loan Program," 1 October 1962, AR-6210-001741, NCI archives.
  7. Rader, *Making Mice*, chap. 4.
  8. "NCI Historical Materials, Vol. V. Report by Dr. Carl Voegtlin on Early Cancer Research of the Public Health Service," p.12. AR-6000-5166, NCI archives.
  9. The Chicago-based physician Frank Edward Simpson, director of the eponymous Simpson Radium Institute, also referred to another less common therapeutic use of radon: the use of radium deposits, the decayed products of radium emanation (labeled RaA, RaB, RaC, RaD, RaE and RaF) that were deposited on the walls of the radon container when the emanation sealed in the container decayed. Frank Edward Simpson, *Radium Therapy* (St. Louis, Missouri: C. V. Mosby, 1922), pp. 114-15.
  10. For discussions of radium therapy apparatus and methods of applying radium, see Simpson, *Radium Therapy*, pp. 109-15. See also American Institute of Medicine for the United States Radium Corporation, *Radium: Abstracts of Selected Articles on Radium and Radium Therapy* (New York: United States Radium Corporation, 1922), pp. 153-60; Ira I. Kaplan, *Practical Radiation Therapy* (Philadelphia and London: W. B. Saunders, 1931), pp. 122-24; Ira I. Kaplan, *Radiation Therapy: Its Use in the Treatment of Benign and Malignant Conditions* (New York: Oxford University Press, 1937), pp. 15-16; A. J. Delario, *A Handbook of Roentgen and Radium Therapy* (Philadelphia, F. A. Davis Company, 1938), pp. 59-70. Radium therapy was also the subject of motion pictures demonstrating therapeutic techniques, including two by Max Cutler available at the National Library of Medicine, Bethesda, Maryland: Max Cutler, *Radium Treatment of Carcinoma of the Cervix* (Produced by Chicago Film Laboratory, Chicago, Illinois: Petrolager Laboratories, 1938); Max Cutler and Jack M. Everett, *Radium Treatment of Mouth Cancer: Dental Vulcanite Moulds Used in the Application of Radium* (Produced by Chicago Film Laboratory, Inc., 1938).
  11. For surveys of the relations between surgery and radium therapy, see David Cantor, "Cancer Control and Prevention in the Twentieth Century," *Bulletin of the History of Medicine*, 2007, 81: 1-38, esp. pp. 12-14; John Pickstone, "Contested Cumulations: Configurations of Cancer Treatments through the Twentieth Century," *Bulletin of the History of Medicine*, 2007, 81: 164-96, esp. pp. 171-81. For a history of radium and cancer in Canada, see Charles Hayter, *An Element of Hope: Radium and the Response to Cancer*

- in Canada* (Montreal: McGill-Queens University Press, 2005). Hayter's book includes a valuable account of the various ways in which radium was used in the interwar years.
12. James Ewing, *Causation, Diagnosis and Treatment of Cancer* (Baltimore: Williams and Wilkins, for the Wayne County Medical Society, Detroit, Michigan, 1931), p. 71.
  13. James Ewing, "Cancer as a Public Health Problem," in *A Symposium on Cancer* (Madison: University of Wisconsin Press, 1938), pp. 73-77, esp. p. 76.
  14. Robert A. Aronowitz, "Do Not Delay: Breast Cancer and Time, 1900-1970," *Milbank Quarterly*, 2001, 79: 355-86.
  15. Ewing, *Causation, Diagnosis and Treatment of Cancer*, p. 70.
  16. Spencer R. Weart, *Nuclear Fear: A History of Images* (Cambridge, Massachusetts: Harvard University Press, 1988). An indication of the scale of efforts to sell various radium impregnated waters, airs, pastes, salves and other substances is provided in the O. Henry short story, *A Tempered Wind* (1908), in which a character, discussing a proposed marketing program, indicates the prominence of radium advertisements: "we want our ads., in the biggest city dailies, top of the column, next to editorials on radium and pictures of the girl doing health exercises." O. Henry, "A Tempered Wind," in *41 Stories by O. Henry*, selected by Burton Rafael (New York: Signet Classic, 1984), pp. 162-78, quote on p.172.
  17. Joseph C. Bloodgood, "The Importance of the Trained Radiologist in Every Cancer Clinic," *Surgery, Gynecology and Obstetrics*, 1932, 55: 676. See also, "Warns on Hiring Radium," *New York Times*, 17 June 1934, p. N2. On efforts to develop standards of radiation dosage and safety, see Daniel Paul Serwer, *The Rise of Radiation Protection: Science, Medicine and Technology in Society, 1896-1935* (Informal Report BNL 22279, Brookhaven National Laboratory, 1976).
  18. Daniel Thomas Quigley, *The Conquest of Cancer by Radium and Other Methods* (Philadelphia: F. A. Davis, 1929), p. 219.
  19. Quigley, *Conquest of Cancer*, p. 220. Simeon T. Cantril, "A Primer of Radiation Therapy," *Radiation Therapy: A Supplement to the Staff Journal of the Swedish Hospital, Seattle, Washington from the Tumor Institute*, February 1940, No. 1: 3-6, p. 3. Cantril takes this point from Harry Sturgeon Crossen and Robert James Crossen, *Diseases of Women* (St. Louis, Missouri: C. V. Mosby, 1935), pp. 685-86. (Note that in his 1940 article Cantril misdates the Crossen and Crossen volume, and provides the wrong page numbers.)
  20. Roger M. Macklis, "The Great Radium Scandal," *Scientific American*, August 1993, 269 (2): 94-99. Roger M. Macklis, "Radithor and the Era of Mild Radium Therapy," *Journal of the American Medical Association*, 1990, 264: 614-18.
  21. The dangers of radium would also have been highlighted to the public by the contemporary scandal over the radium dial painters. See Claudia Clark, *Radium Girls: Women and Industrial Health Reform, 1910-1935*

- (Chapel Hill: University of North Carolina Press, 1997). For a comparison of different national approaches to radiation protection, see Serwer, *Rise of Radiation Protection*.
22. "Importations of Radium," *Journal of the American Medical Association*, 1934, 103: 1161.
  23. Of the 124.7 grams, the report noted that hospitals owned about 85.8 grams, physicians had 33,286.93 mg, and laboratories and companies had 5,545.42 mg. It estimated that a further 117.4 grams were needed for medical purposes. R. R. Sayers, "Radium in Medical Use in the United States," *Radiology*, 1933, 20: 305–10, p. 308. This is a reprint of R. R. Sayers, *Radium in Medical Use in the United States* (Department of Commerce, United States Bureau of Mines Information Circular, I.C. 667, October 1932). See also, "Radium in the United States," *Journal of the American Medical Association*, 1932, 99: 1609. This is reprinted in part in "Radium in the United States," *Bulletin of the American Society for the Control of Cancer*, December 1932, 14 (12): 3. For other estimates of the quantity of radium in the country, see John W. Cox's estimate of 80 grams in Herbert L. Lombard, "State-Aided Cancer Clinics in Massachusetts," *Surgery, Gynecology and Obstetrics*, 1931, 52: 536-41, on p. 540. Reprinted as John Cox, "The Present Status of Cancer Treatment Facilities in the United States," *Bulletin of the American Society for the Control of Cancer*, May 1931, 8 (5): 1-2 & 8, p. 2. And there is an ASCC estimate of 85,228 mg. owned in quantities of 75 mg. and over in the United States. "Radium Owned by Hospitals and Physicians," *Journal of the American Medical Association*, 1931, 96: 2057.
  24. Christine Sadler, "'Conquer Cancer' Adopted as Battle Cry of the Public Health Service," *Washington Post*, 8 August 1937, p. 2. In 1939 it was estimated that there were 133 grams of radium in use in the country. According to a report by the ASCC, public health experts estimated that there should be 2 grams for every million people, or at least 260 grams for the entire country. See, "Radium Loans," *National Bulletin of the American Society for the Control of Cancer*, September 1939, 21(9): 11.
  25. The best accounts of the history of radium production are Edward R. Landa, "The First Nuclear Industry," *Scientific American*, November 1982, 247(5): 180-93, and Edward R. Landa, "Buried Treasure to Buried Waste: The Rise and Fall of the Radium Industry," *Colorado School of Mines Quarterly*, Summer 1987, 82(2): i-viii + 1-77.
  26. See, for example, Union Minière du Haut Katanga, *Radium: Production—General Properties—Therapeutic Applications—Apparatus* (Brussels: Union Minière du Haut Katanga, n.d. probably late 1920s/early 1930s), pp. 12-18.
  27. Landa, "First Nuclear Industry," p. 189.
  28. National Advisory Cancer Council (hereafter NACC) meeting, 9 November 1937, pp. 99-100, Record Group 443, Box 6, National Archives, College Park, Maryland.
  29. Sadler, "Conquer Cancer," p. 2.

30. In 1932, R. R. Sayers noted that five states reported no radium in hospitals and that one state, Wyoming, had no radium available for medical purposes at all. Sayers, "Radium in Medical Use in the United States," p. 308.
31. A. U. Desjardins, "Radium in the United States," *Journal of the American Medical Association*, 1932, 99: 2133-34. Reprinted in Arthur U. Desjardins, "Radium in the United States," *Bulletin of the American Society for the Control of Cancer*, March 1933, 15(3): 6.
32. Carl R. Bogardus, "Intersociety, Government, and Economic Relations," in *Radiation Oncology*, vol. 3 of *X-ray Centenary History volumes of the American Radiological Society*, ed. R. A. Gagliardi and J. F. Watson (Virginia: Radiology Centennial Inc., 1996), pp. 201-29, at p. 218. "Bill Asks Radium for War Debt," *New York Times*, 9 March 1934, p. 22. For the position of the Union Minière du Haut Katanga on radium war-loan repayment see "Radium Firm Leans to Exchange on Debt," *Washington Post*, 10 March 1934, p. 15.
33. On the ASCC campaign in the 1920s to promote clinics, see Ella Hoffman Rigney, "The American Society for the Control of Cancer, 1913-1943 (continued)," *Bulletin of the American Cancer Society*, 1944, 26: 134-142, on p. 136. This campaign continued into the 1930s, and the ASCC undertook cancer surveys in numerous states to encourage the development of services, including Kansas, Iowa, Minnesota, Missouri, Colorado, and Nebraska. For an example of one survey, see Frank Leslie Rector, "A Report of a Survey of Nebraska," *Nebraska State Medical Journal*, 1935, 20: 409-42.
34. Ella Hoffman Rigney notes that by 1925 there were 15 permanent cancer clinics: Huntington Memorial Hospital, Boston, Massachusetts; New York State Institute for Malignant Disease, New York; Barnard Free Skin and Cancer Hospital, St. Louis, Missouri; Columbus Cancer Clinic, Columbus, Ohio; Blodgett Memorial Hospital, Grand Rapids, Michigan; Albert Stein Ward (Grady Hospital) for Cancer and Allied Diseases, Atlanta, Georgia; Memorial Clinic and Cancer Institute of the Hospital of the University of Minnesota, Minneapolis, Minnesota; Memorial Hospital, New York Skin and Cancer Hospital, and New York City Cancer Institute, all in New York, New York; Pittsburgh Skin and Cancer Foundation, Pittsburgh, Pennsylvania; American Oncologic Hospital and Philadelphia General Hospital, Philadelphia, Pennsylvania; Rochester Clinic of the New York State Branch of the American Society, Rochester, New York; and the Cancer Clinic of the Women's Welfare Association, Washington, D.C. Rigney, "American Society for the Control of Cancer, 1913-1943," p. 137.
35. American College of Surgeons, "Organization of Service for the Diagnosis and Treatment of Cancer. Recommended by the Committee on the Treatment of Malignant Diseases of the American College of Surgeons," *Surgery, Gynecology and Obstetrics*, 1930, 51: 570-74. For later attempts to link the NCI's radium program to the development of cancer clinics, see Ludvig Hektoen in "Discussion of Symposium on Cancer Clinics in General Hospitals," *Radiology*, 1943, 40: 561.

36. Lombard, "State-Aided Cancer Clinics in Massachusetts."
37. Clifton R. Read, "State Cancer Programs," *Bulletin of the American Society for the Control of Cancer*, August 1938, 20(8): 8. For a survey of state cancer control programs in 1940, see NCI, USPHS, "A Résumé of State Cancer Control Programs," February 1940, Department of Public Health, Bureau of Administration, Administrative Files of the State Health Office, 1933-1940, SG 7110, Folder "United States Public Health Service 1940," Alabama Department of Archives and History, Montgomery, Alabama.
38. On public education efforts in the 1930s, see Patterson, *Dread Disease*; Aronowitz, "Do Not Delay;" Breslow et al., *History of Cancer Control in the United States*; 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).
39. Faced with a shortfall in money that prompted the closure of all its clinics, in 1940/1941, the state of South Carolina continued to carry out cancer education programs, perhaps in the hope of creating demand for these clinics and for radium, and so pressuring the state legislature for funding. *Sixty-Second Annual Report of the State Board of Health of South Carolina, 1 July 1940-30 June 1941*, p. 142.
40. See, for example, "Report of the Cancer Committee," *Transactions of the Forty-Ninth Annual Meeting of the Medical Society of Hawaii. Reorganized 1925, as the Hawaii Territorial Medical Association, 1939*, pp. 5-8.
41. For an unpublished history of cancer legislation and of pre-1937 involvement of the federal government in cancer research, see the anonymous document that begins "This chapter tells of the growing concern in Congress about cancer during the 1920's, culminating in establishment of the National Cancer Institute in 1937; and a brief outline of cancer research in the PHS from 1922 to 1937," (no date), AR-0000-000188, NCI archives. Note that the 1930 bill S.4531 focused on cancer control as well as research
42. Patterson, *Dread Disease*, p. 128.
43. On Maverick, see Judith Kaas Doyle, "Out of Step: Maury Maverick and the Politics of the Depression and the New Deal" (Ph.D. dissertation, University of Texas at Austin, 1989); Richard B. Henderson, *Maury Maverick: A Political Biography* (Austin: University of Texas Press, 1970). There is no book-length biography of Bone, but see the notes provided with the finding aid for his papers at Washington University, St. Louis, <http://www.lib.washington.edu/specialcoll/findaids/docs/papersrecords/BoneHomer3456.xml> (accessed 6 July 2007). On Magnuson, see Shelby Scates, *Warren G. Magnuson and the Shaping of Twentieth-Century America* (Seattle: University of Washington Press, 1997).
44. Thomas Parran to Homer T. Bone, 18 March 1937, AR-3703-002326, NCI archives.



45. Thomas Parran to Maury Maverick, 28 December 1936, AR-3612-002276, NCI archives.
46. See, for example, the comments by Francis C. Wood in NACC meeting, 9 November 1937, pp. 46-49. Francis Carter Wood, "Cancer Research Found Seriously Handicapped," *New York Times*, 4 April 1937, p. 72. "Cancer: The Great Darkness," *Fortune*, March 1937, 15 (3): 112-14, 162, 164, 167-68, 170, 172, 174, 176, 179.
47. Henry E. Sigerist, "The Historical Development of the Pathology and Therapy of Cancer," *Bulletin of the New York Academy of Medicine*, 1932, 8: 653.
48. James Ewing, "The Practical Results of Modern Cancer Research," *Journal of the Medical Society of New Jersey*, 1937, 34: 667-72, quote on p. 672.
49. James Ewing, in U.S. Congress, Senate, *Cancer Research: Joint Hearings*, p. 53.
50. See also James Ewing to L. R. Thompson, 11 June 1937, AR-3700-002244, NCI archives.
51. Olin West representing the American Medical Association, in U.S. Congress, Senate, *Cancer Research: Joint Hearings*, pp. 63-70.
52. Clarence Little, in U.S. Congress, Senate, *Cancer Research: Joint Hearings*, p. 56.
53. Thomas Parran, in NACC meeting, 9 November 1937, p. 50.
54. Perhaps it was for this reason that Ewing was opposed to the radium program. James Ewing, in U.S. Congress, Senate, *Cancer Research: Joint Hearings*, p. 53.
55. Note also the comment by the Secretary of the Treasury that, without both research and facilities for early diagnosis and treatment, any campaign against cancer would only be "partly successful." Secretary of Treasury to Clarence F. Lea, Chair, House of Representatives Committee on Interstate and Foreign Commerce, n.d. probably 1937, AR-3700-003251, NCI archives.
56. J. W. Schereschewsky, "Memorandum Relative to the Desirability of Establishing a Combined Cancer Treatment and Cancer Research Center in the Public Health Service," no date, AR-2900-000058, NCI archives. Schereschewsky retired from Harvard in November 1937 and moved to Georgia. NACC meeting, 9 November 1937, p. 86. For a biography of Schereschewsky, see H. B. Andervont, "J. W. Schereschewsky: An Appreciation," *Journal of the National Cancer Institute*, 1957, 19: 331-33.
57. Dudley Jackson to Maury Maverick, 19 April 1937, in "NCI Historical Materials, Vol. 4, Exhibits to Accompany Vols. I, II, and III, Copies 1 and 2," Exhibit 29, AR005165, NCI archives.
58. The 1937 Act in fact allowed the radium to be used "for the study of the cause, prevention, or methods of diagnosis or treatment of cancer, or for the treatment of cancer," but it was treatment rather than research or study that dominated the use of radium. See the copy of the act in "NCI Historical Materials, Vol. II," AR-6000-005163, NCI archives. For

- exceptions, note the report that Strong Memorial Hospital in Rochester, New York, obtained 200 mg. of radium, worth about \$6,000 for cancer treatment and research. "Hospital Gets \$6,000 in Radium," *Democrat and Chronicle* (Rochester), 26 September 1939.
59. For example, at a time when Grace Hospital in New Haven, Connecticut, had no radium, an article in the hospital journal bemoaned the huge sums given to cancer research while so little was given to routine radium therapy. "Radium Valueless Unless Funds Are At Hand for Cancer Cure: Lack of Radium Supply for Cancer Treatment Deplored," *The Grace Hospital News*, August 1937, 1 (6): 4.
  60. NACC meeting, 9 November 1937, pp. 99-101.
  61. The Canadian Eldorado Radium Company told Winthrop K. Coolidge in 1939 that within a year or two the price of radium could rise to \$35,000 per gram. The Japanese were purchasing radium steadily, several institutions in the United States had substantial appropriations for its purchase, and supplies were limited. Coolidge also reported that Dr. Curtis at the National Bureau of Standards also expected the price to rise, though he did not venture an opinion as to how high it might go. Winthrop K. Coolidge to Howard A. Kelly, 31 May 1939, Howard A. Kelly papers, Box 7, Folder, "Radium 1939," Alan Mason Chesney Medical Archives, The Johns Hopkins Medical Institutions, Baltimore, Maryland. On the Belgian-Canadian agreement, see Landa, "First Nuclear Industry," and Landa, "Buried Treasure to Buried Waste."
  62. For example, the Citizen's Hospital in Talladega, Alabama, wanted to sell the government 50 mg. of radium, Claude Sims to J. N. Baker, 20 January 1939, and J. N. Baker to Claude Sims, 23 January 1939. Department of Public Health, Bureau of Administration, Administrative Files of the State Health Office, 1939, SG 7106, Folder "United States Public Health Service 1939," Alabama Department of Archives and History. Also, Howard A. Kelly, the physician who established the Kelly Hospital in Baltimore, was advised to try the NIH when he considered selling radium in 1939. Charles L. Parsons to Howard A. Kelly, 7 June 1939, Box 7, Folder, "Radium 1939," Alan Mason Chesney Medical Archives, The Johns Hopkins Medical Institutions.
  63. Hon, "National Cancer Institute Radium Loan Program," p. 4. A 1939 press release noted that 8.5 grams of radium were allocated to 35 hospitals in 1939. Later a further 13 were allocated in 1940, suggesting the one hospital had already dropped out, possibly the Fulton State Hospital in Missouri. On the original loan, see the U.S. Public Health Service press release B-3006, 21 July 1939, in RG 26-2-3, "U.S. Public Health Service Records," Georgia Department of Archives and History, Morrow, Georgia. On the second loan, see "Radium Loans," *Bulletin of the Greenville County Medical Society*, 1940, 3: 108-9.



64. The NCI established a clinical cancer research center in the U.S. Marine Hospital at Baltimore, Maryland, under Dr. John E. Wirth. This center was a cooperative project between the Hospital Division of the Public Health Service and the National Cancer Institute. It aimed to bring in all cancer patients east of the Mississippi River who were eligible for treatment in the U.S. Marine Hospitals.
65. See the folder, "Radium, Use of NCBH (1941-1956)," Dorothy Carpenter Medical Archives, Wake Forest University Baptist Medical Center, Winston-Salem, North Carolina.
66. For details of one visit to all hospitals in 1942, see Leonard A. Scheele to James N. Baker (State Health Officer, Alabama), 31 December 1940, Department of Public Health, Bureau of Administration of the State Health Office, 1941, SG 7111, Folder "United States Public Health Service through Miscellaneous 1941 National," Alabama Department of Archives and History. Scheele noted that he and the physicist Mr. Dean Cowie would visit each of the hospitals.
67. NACC meeting, 24 June 1940, pp. 6 & 23, RG 443, Box 7, National Archives. The NACC worried that the complaint about Sedgwick was motivated by local rivalries. In the same meeting, another complaint prompted the NCI to consider a visit to the Nashville General Hospital.
68. Very few records survive regarding the application process for a radium loan. One exception is that of the application by the University of Arkansas Hospital in Class 20DB8, Box 7, Record Group, "College of Medicine Dean's Office," Folder, "Cancer-Tumor Clinic, Minutes of Faculty Meetings, 1939-1941," University of Arkansas for Medical Sciences Archives, Historical Research Center, UAMS Library, Little Rock, Arkansas. This was a late application, begun in 1940, and the university did not get the radium until after 1943; hence its absence from Table 2.
69. Shortly before it acquired NCI radium, the New Britain General Hospital in Connecticut noted that a lack of radium meant it had to send patients elsewhere. Paul D. Rosahan, "Summary of Experiences with Malignancies at New Britain General Hospital, 1929-1938," *Journal of the Connecticut State Medical Society*, 1939, 3: 405.
70. For example, in 1936/1937 Shreveport Charity Hospital's O. K. Allen tumor clinic noted that because of its limited facilities it had had to return patients to their homes and have them appear at a later date for treatment. "The most serious handicap which remains is the lack of enough X-ray Therapy equipment and Radium to enable us to dispose of all cases without delay." *Report of Shreveport Charity Hospital for the Biennial Period, 1936-1937*, p. 18.
71. American College of Surgeons, "Organization of Service for the Diagnosis and Treatment of Cancer. Recommendations by the Committee on the Treatment of Malignant Diseases, American College of Surgeons," *Surgery*,

*Gynecology and Obstetrics*, 1930, 51: 570-74. The rules for recognition were printed each year with the list of approved clinics; see the citations for approved clinics in Table 2. Thomas H. Russell, "Report of the Committee on Tumor Study," *Proceedings of the Connecticut State Medical Society*, 1934, 142nd Annual Meeting: 47- 50, p. 47.

72. Deborah Kraut in a private communication suggests that administrators at Newark Beth Israel Hospital may have applied for a loan as part of a broader effort to reform the hospital. In 1936, Abraham Lichtman, the incoming hospital president at Beth Israel, initiated changes consistent with what had been implemented at Brooklyn Jewish: physicians who were operating their own practices within the hospital and "paying" an overhead, were given the opportunity to become hospital staff—or leave. The laboratory chief was terminated and replaced, the anesthesia division reorganized, and the physician who was delivering his personal bills to the patients' beds during their recovery from an operation was reprimanded. Subsequently, his name disappeared from the rolls. As a committee was formed to review the radiation therapy program that same year, Dr. M. Friedman, who owned the radium used by the hospital, was nudged out, and ultimately left, taking his needles with him. On Newark Beth Israel Hospital, see Alan M. Kraut and Deborah A. Kraut, *Covenant of Care: Newark Beth Israel and the Jewish Hospital in America* (New Brunswick, New Jersey: Rutgers University Press, 2007).
73. These were Danbury Hospital, Connecticut; Mercy Hall Hospital, Detroit, Michigan; Newark City Hospital, New Jersey; Charlotte Memorial Hospital, North Carolina; North Carolina Baptist Hospital, Winston-Salem, North Carolina; Misericordia Hospital, Philadelphia, Pennsylvania; Greenville General Hospital, South Carolina; and Tri-County Hospital, Orangeburg, South Carolina.
74. The problem had begun before the creation of the NCI, when hospital and state authorities found that clinics were a magnet for indigent patients, which led to more demands for more expensive equipment that threatened to overwhelm resources. For example, following the opening of a clinic at the City Hospital in Worcester, Massachusetts, there was an increase in X-ray treatment, amounting to some 45 percent more than the previous year. The numbers of patients increased again in 1941 by 145, so that a total of 297 patients had come under the supervision of staff members interested in cancer. See *Annual Report of the Trustees of the City Hospital of the City of Worcester for the Year Ending December 31, 1939, 1940*, p. 5; *Annual Report of the Trustees of the City Hospital of the City of Worcester for the Year Ending December 31, 1941, 1942*, p. 3. Similarly, Los Angeles County General Hospital reported an increase of 19 percent in 1937/1938 in the total work load of the Radiology Service, with striking increases in therapeutic exposures and radiation treatments (X-rays and radium), being 20 percent and 27 percent respectively. See County of Los Angeles,

- Department of Charities, *Los Angeles County General Hospital, Annual Report for the Fiscal Year ended June 30, 1938*, p. 49. See also the comments of James Ewing in NACC meeting, 14 February 1938, p. 542, RG 443, Box 6, National Archives.
75. For example, in 1937 the Indianapolis City Hospital noted that its tumor or cancer clinic had increased its average daily attendance over the past year, due to referrals by doctors in other clinics of suspicious malignant lesions, and also due to the follow-up work being done. Patients, it argued, were becoming more conscious of the need for periodical examinations and were cooperating better than in the past. The City Hospital opened a new cancer clinic in 1938, financed with a philanthropic gift of \$100,000 that offered free diagnosis and treatment to the poor. The NCI's loan of radium in 1940 was part of this broader hospital effort to expand cancer services. See *Annual Report of the City Hospital, Indianapolis, Indiana, for the Year ending December 31, 1937*, p. 31; Hester Anne Hale, *Caring for the Community: The History of Wishard Hospital* (Indianapolis: Wishard Memorial Foundation, 1999), p. 79; "City Hospital Given Radium Worth \$7000," *Indianapolis News*, 18 March 1940, pt. 2, p. 1.
  76. One hospital in Waycross, Georgia, was turned down for a loan because the hospital did not have a qualified radiotherapist to handle the radium. The local medical society protested this decision, because the local physician had installed, at his own expense, a deep X-ray therapy machine, and because following the reopening of the clinic, X-ray cases had gone elsewhere. Kenneth McCullough (Secretary, Ware County Medical Society) to T. F. Abercrombie (Director, Georgia Department of Public Health), 13 November 1939; T. F. Abercrombie to Kenneth McCullough, 18 November 1939; R. Mosteller (Director, Cancer Control, State of Georgia) to Kenneth McCullough, 20 November 1939; T. F. Abercrombie to Dr. B. H. Minchew (Waycross, Georgia), 28 November 1939; B. H. Minchew to T. F. Abercrombie, 4 December 1939, all in Public Health Director Correspondence Files, Record Group 26, Sub-Group 2, Series 3, Georgia Department of Archives and History.
  77. Connecticut was one of the most successful states in acquiring federal radium, with six hospitals in receipt of radium by 1943, more than any other state. On cancer control in Connecticut, see Charles L. Larkin, "Cancer Problem in Connecticut," *Journal of the Connecticut State Medical Society*, 1936, 1: 15-17; Charles L. Larkin, "Cancer Organization in Connecticut," in Tumor Committee of the Connecticut State Medical Society, *Cancer: A Handbook for Physicians* (Hartford, Connecticut: Connecticut State Department of Health, 1939), pp. 12-18; Herbert F. Hirsche, "The Connecticut State Tumor Program," *Connecticut State Medical Journal*, 1940, 4: 468-70.
  78. The loans to the Barnard Free Skin Hospital, the Kansas City General Hospital, the Ellis Fischel State Cancer Hospital, and the Fulton State

Hospital were part of a broader attempt to create a cancer control program in Missouri eventually based around the Ellis Fischel Hospital which opened in 1940. The origins of this scheme can be traced in *Second Biennial Report of the Board of Managers of the State Eleemosynary Institutions to the Fifty-Third General Assembly of the State of Missouri for the Two Fiscal Years beginning January 1, 1923, and Ending December 31, 1924* (Jefferson City: State of Missouri, 31 December 1924), p. 13; *Seventh Biennial Report of the Board of Managers of the State Eleemosynary Institutions to the Fifty-Eighth General Assembly of the State of Missouri for the Two Fiscal Years beginning January 1, 1933, and Ending December 31, 1934* (Jefferson City: State of Missouri, 31 December 1934), pp. 39-40; *Eighth Biennial Report of the Board of Managers of the State Eleemosynary Institutions to the Fifty-Ninth General Assembly of the State of Missouri for the Two Fiscal Years beginning January 1, 1935, and Ending December 31, 1936* (Jefferson City: State of Missouri, 31 December 1936), pp. 31-32; *Ninth Biennial Report of the Board of Managers of the State Eleemosynary Institutions to the Sixtieth General Assembly of the State of Missouri for the Two Fiscal Years beginning January 1, 1937, and Ending December 31, 1938* (Jefferson City: State of Missouri, 31 December 1938), pp. 27-28. All these reports are available in a Box titled "Reports of Eleemosynary Institutions," Missouri State Archives, Jefferson City, Missouri. On Fulton, see Richard L. Lael, Barbara Brazos, and Margot Ford McMillen, *Evolution of a Missouri Asylum: Fulton State Hospital, 1851-2006* (Columbia: University of Missouri Press, 2007).

79. The loans to the City-County Hospital in La Grange, the Emory Hospital in Atlanta, and the University Hospital in Augusta, were part of a broader effort by the state health department to establish a network of cancer clinics and hospitals across Georgia. All three hospitals had established tumor clinics shortly before the NCI program. The Georgia scheme is discussed in the body of this paper.
80. Loans to Greenville General and Tri-County Hospitals were part of a South Carolinian anti-cancer crusade that was established under the state's 1939 cancer act. Greenville and Tri-County were two of nine hospitals in South Carolina which agreed to accept state-aid patients under the state board of health's plan for the treatment of indigent cancer patients which began operation on 1 May 1940. Under this plan, the state board of health would pay for hospital care and the use of X-rays and radium in diagnosis and treatment and physicians were to give their services free of charge. The plan was evolved in accordance with a law submitted by the cancer commission of the South Carolina Medical Association and passed by the legislature. See "Cancer Control in South Carolina," *Bulletin of the Greenville County Medical Society*, 1939, 2: 115; "General Hospital to Treat Needy Cancer Victims with State Aid," *Greenville Piedmont*, 30 April 1940, p. 9; General Assembly in June 1939, *Acts and Resolutions of the General Assembly*

- of the State of South Carolina*, Regular Session of 1939, First Part of Forty First Volume of Statutes at Large, pp. 464-65.
81. On the impact in the southern part of the state of the NCI loan of 90 mg to the Vermont Cancer Commission at Rutland, see *First Annual Report of the Vermont State Cancer Commission for the Year Ending June 30, 1940*, p. 5.
  82. In Alabama, a loan to Hillman Hospital in Birmingham took place against concern about limited supplies of radium in the state and the impact this had on broader attempt to develop cancer services. Hillman itself had obtained its first radium—50 grams from its Lady Board of Managers—in 1939 amid concerns that it had been forced to borrow radium from local doctors. See “Grain of Radium is Given Hillman to Treat Cancer,” *Birmingham News*, 11 July 1938; “Hillman Will Be Given Its Own Radium,” *Birmingham Post*, 9 July 1938; “Hillman Hospital Gets Money for Radium,” *Birmingham News Age Herald*, 1938. These clippings are from Collection MC51, Folder 140H, UAB archives, University of Alabama at Birmingham. The articles differ as to whether the hospital obtained 50 or 60 mg. “Hillman Gets First Radium,” *Birmingham Post*, 1 November 1938, Collection MC28, Folder 1.14, UAB archives. The Hillman Hospital created its first tumor clinic in 1940, the year it also obtained government radium. See, for example “Hillman Keeps Pace with Medical Advances,” *Birmingham Post*, 7 May 1941, p. 7.
  83. T. F. Abercrombie to R. R. Spencer (Executive Assistant, NIH), 22 March 1938, U.S. Public Health Service Records (Report Files), Record Group 26, Sub-Group 2, Series 3, Georgia Department of Archives and History.
  84. “Radium Loan Regulations,” *Bulletin of the American Society for the Control of Cancer*, December 1938, 20 (12): 9. Hon, “National Cancer Institute Radium Loan Program.” Raymond Kaiser and Rosalie Peterson, Memorandum, 1959, “Activities of the Field Investigations and Demonstrations Branch,” p. 12. RG 443 Accession Number 73-556, FRC Box 20/2, National Archives; Folder: “Organization (NCI—Field Investigations & Demonstrations Branch) (Formerly: (CA. Control Br.)” (Unprocessed box marked with NIH-NCI-OD and NN3 443-95-011), National Archives.
  85. T. F. Abercrombie to R. R. Spencer, 22 March 1938. The point was echoed by the acting director of cancer control in Georgia. See J. W. Schereschewsky to Dr. L. R. Thompson (Director, NIH), 30 May 1938. Both in U.S. Public Health Service Records (Report Files), Record Group 26, Sub-Group 2, Series 3, Georgia Department of Archives and History.
  86. Clarence Little in NACC meeting, 25 July 1938, p. 120, RG 443, Box 6, National Archives.
  87. Hon, “National Cancer Institute Radium Loan Program,” p. 3.
  88. “Radium Loan Regulations,” p. 9; Hon, “National Cancer Institute Radium

- Loan Program;” Kaiser and Peterson, Memorandum, 1959, “Activities of the Field Investigations and Demonstrations Branch,” p. 12.
89. Carl Voegtlin to Dr. S. P. Cromer (Dean of the School of Medicine, University of Arkansas), 9 April 1941, in Class 20DB8, Box 7, Record Group “College of Medicine Dean’s Office,” Folder, “Cancer–Tumor Clinic. Minutes of Faculty Minutes, 1939-1941,” Historical Research Center, University of Arkansas Medical Sciences Archives. The University of Arkansas was in the process of applying for NCI radium. In this letter, Voegtlin asked whether the gynecological surgeon and radium therapist, Dr. Glenn Johnson, who was to handle the radium at the University of Arkansas, had the equivalent qualification of the diploma of the ABR. Johnson did not have the diploma, and this request led the Dean of the College of Medicine to write several letters to physicians asking for statements that Johnson’s qualifications were equivalent to this qualification. For similar concerns about the liability of the government for the mishandled radium, see comments by L. R. Thompson, in NACC meeting, 25 July 1938, p.125.
  90. J. W. Schereschewsky to Dr. L. R. Thompson (Director, NIH), 30 May 1938 in U.S. Public Health Service Records (Report Files), Record Group 26, Sub-Group 2, Series 3, Georgia Department of Archives and History. The Georgian solution was that the state would be responsible for maintaining minimal standards at centers, by appointing a consulting radiologist who would standardize treatment at the various centers in Georgia. For concern that the federal regulations for providing free radium treatment might be a problem for the clinic at Augusta, see G. T. Bernard to T. F. Abercrombie, 25 July 1939, Public Health Director Correspondence Files, Record Group 26, Sub-Group 2, Series 3, Georgia Department of Archives and History.
  91. Hon, “National Cancer Institute Radium Loan Program,” p. 4.
  92. J. W. Schereschewsky to Dr. L. R. Thompson (Director, NIH), 30 May 1938, U.S. Public Health Service Records (Report Files), Record Group 26, Sub-Group 2, Series 3, Georgia Department of Archives and History.
  93. Hopes of obtaining radium for a bomb to be located at Memorial seem to have died in February 1938. See comments by Ewing and Little in NACC meeting, 14 February 1938, p. 533, RG 443, Box 6, National Archives.
  94. NACC meeting, 9 November 1937, p. 99.
  95. F. G. Spear and K. Griffiths, *The Radium Commission: A Short History of its Origin and Work, 1929-1948* (London: HMSO, 1951), p. 36, n. 2. The NACC noted that the British were purchasing 15 grams of radium in 1937. See NACC meeting, 14 February 1938, p. 504.
  96. Spear and Griffiths, *Radium Commission*; 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. dissertation, Lancaster University, 1987); Caroline Murphy, “A History of

- Radiotherapy to 1950: Cancer and Radiotherapy in Britain, 1850-1950” (Ph.D. dissertation, University of Manchester, 1986).
97. NACC meetings, 14 February 1938, pp. 501-2 and 28 April 1938, p. 498, in RG 443, Box 6, National Archives.
  98. Sadler, “Conquer Cancer,” p. 2.
  99. Hektoen noted that the appropriation for 1938 was the same as for the previous year, but that there was no requirement to use the money for particular purposes. Ludvig Hektoen, “The National Cancer Institute Act,” *Bulletin of the American Society for the Control of Cancer*, October 1938, 20 (10): 1-3, on p. 2.
  100. On Little’s opposition to the distribution of radium for treatment, see NACC meeting, 9 November 1937, p. 93. He preferred that the radium be used for research.
  101. Comments of R. R. Spencer in NACC meeting, 3 January 1939, p. 89, RG 443, Box 7, National Archives.
  102. Comments probably by Ora Marshino, “NCI Historical Materials, Vol. III,” AR-6000-005164, NCI archives. The NACC was advised by the Director of NIH, L.R. Thompson, that the \$200,000 allocated to radium could be reduced. See NACC meeting, 9 November 1937, p. 34. He later noted that legal counsel said that unless the \$200,000 was spent on radium the money would revert. NACC meetings, 14 February 1938, pp. 501-2 and 28 April 1938, p. 613, RG 443, Box 6, National Archives.
  103. NACC meeting, 3 October 1938, pp. 114-21, RG 443, Box 6, National Archives.
  104. Meeting of Committee on Cancer Service, and Training of Cancer Specialists, Memorial Hospital, New York City, 8 January 1938, AR-005168, NCI Archives.
  105. NACC meeting, 14 February 1938, p. 535.
  106. NACC meeting, 3 October 1938, p. 111.
  107. NACC meeting, 3 October 1938, p. 113.
  108. On radium applications and congressional interest in present cancer patients, see comments by Ludvig Hektoen and Francis C. Wood, NACC meeting, 3 October 1938, pp. 100 and 110.
  109. Six of the seventy-five hospitals that received radium terminated their original contracts, and reapplied for a second loan, all of which were approved. Thirty-four institutions remained in the program until all the contracts were terminated in 1962 at the time of reorganization. Hon, “National Cancer Institute Radium Loan Program.”
  110. For an example of a hospital that wanted NCI radium but did not obtain any, see the discussion about the Juanita Coleman Colored Hospital in Demopolis, Alabama. It is unknown why the hospital did not receive government radium, or even if its application got beyond the state health office: J. N. Baker to A. H. Bobo, 27 January 1939, and A. H. Bobo to J. N. Baker, 23 September 1939 in Department of Public Health, Bureau



- of Administration, Administrative Files of the State Health Office, 1939, SG 7106, Folder "United States Public Health Service 1939," Alabama Department of Archives and History.
111. NACC meeting, 19 January 1942, pp. 97-104, RG 443, Box 8, National Archives.
  112. See the following correspondence: Ora Marshino to Dr. R. R. Spencer, 19 October 1944; R. R. Spencer to Surgeon General, 20 October 1944; Charles W. Staub to Asst. Surgeon General, L. R. Thompson 9 November 1944; Ora Marshino to Dr. R. R. Spencer, 21 December 1944; Ora Marshino to Dr. R. R. Spencer, 10 February 1945; R. R. Spencer to Ora Marshino, 12 February 1945. All in NCI records: File titled "Legal (Legal Decisions—NCI Act 1937-1947)" (As of 30 October 2000, this file was due to be transferred to the National Archives.)
  113. Kaiser and Peterson, Memorandum, 1959, "Activities of the Field Investigations and Demonstrations Branch," p. 12.
  114. The problem emerged when radiologists at the various hospitals began to ask to exchange radium appliances on loan to them for sizes more suitable to their needs. These requests prompted a survey of the use of radium which revealed a huge variation among the hospitals in the frequency of testing for leakage, contamination, and uniformity of distribution of the radium in the containers. See Hon, "National Cancer Institute Radium Loan Program," p. 5 ff. For a discussion of how the National Bureau of Standards handled NCI radium, see the following documents regarding the renewal of the contract in 1959: A. V. Austin to Director, NCI, 13 June 1958; N. B. Hon, "Contract for Radium Handling," 5 September 1958; Scott W. Smith to N. B. Hon, 22 September 1958; Owen W. Scott, "Agreement for Radium Handling by National Bureau of Standards," 3 October 1958; H. K. Painter to A. V. Austin, 8 October 1958: All in AR-5810-001739, NCI archives.
  115. NACC meeting, 24 June 1940, pp. 7-25, RG 443, Box 7, National Archives. Quotation at p. 8. This survey was not of clinics to which the NCI had loaned radium, but members of the NACC saw implications for its own program.
  116. The committee was headed by Eugene Pendergrass: Hon, "National Cancer Institute Radium Loan Program," p. 8. For other documents, see N. B. Hon, "Study and Correction of Radium Loan Program," 12 June 1959, AR-5906-001750, NCI archives; Eugene P. Pendergrass to Noka B. Hon, 25 June 1959, AR-5906-001757, NCI archives; N. B. Hon, "Cost and Schedule of Conversion of the Radium Loan Program," 6 August 1959; "Conversion of Unusable Radium," 10 September 1959; R. G. Temple, "Conversion of Unusable Radium," 19 October 1959; Chief, Property and Supply Section, SMB, "Conversion of Unusable Radium," 23 October 1959, AR-5910-001751, NCI archives; Noka B. Hon and Owen W. Scott, "Surrender of Radium for Conversion and for Salvage,"



- 25 January 1960, AR-6001-001749, NCI archives. Contract #SA-43-ph-3081 with the Canadian Radium and Uranium Corporation in the amount of \$73,189.05, to handle the technical work of reconditioning the radium loaned to hospitals, dated 20 April 1960 is available in AR-6004-001744, NCI archives.
117. Kenneth M. Endicott to Eugene P. Pendergrass, 12 October 1960; Eugene P. Pendergrass to Kenneth M. Endicott, 17 October 1960, AR-60101-001760, NCI archives.
  118. In January 1961, the NCI's director invited a group of experts to serve on a joint committee to recommend standards for allocation of radium. Chaired by Dr. M. M. Copeland, the committee comprised Drs. Harry M. Nelson, Justin J. Stein, James P. Cooney, Noka B. Hon, Eugene P. Pendergrass, Arnie Arneson, Robert Gorson, Robert J. Shalek, and met on 9 February 1961 at the American College of Surgeons, in Chicago, Illinois. In June 1961 another committee produced a "Guide for Protection Against Radiations from Radium in Storage, Use, and Handling." Prepared in accordance with the recommendations of the National Committee on Radiation Protection Handbook No. 73, and in consultation with an ad hoc committee with representatives of the Cancer Committee of the American College of Surgeons. The NCI staff was assisted by: Dr. E. P. Pendergrass, Antolin Raventos, John Hale, J. Robert Andrews, Wendell G. Scott, Lauriston Taylor and Noka B. Hon. "Highlights Relating to National Cancer Institute Personnel And Programs: 1910-1973," January 1984, AR-0000-000358, NCI archives. See also Hon, "National Cancer Institute Radium Loan Program."
  119. Hon, "National Cancer Institute Radium Loan Program," p. 15.
  120. William L Ross, "Cancer Control Branch Activities. A Report to the National Advisory Cancer Council," November 1966, p. 3. In RG 443. Accession Number 73-556, FRC, Box 1 of 2 (Unprocessed box marked with NIH-NCI-OD and NN3-443-95-011), file "Organization 2-1 (Cancer Control Branch Program)," National Archives.
  121. Karen Hubbard (NCI) email to David Cantor (OD) Cc: Ressa Nichols (NCI) Subject: Records Request. Sent: Thursday, September 14, 2000, 9:33 AM. "We checked our records again and have come to the conclusion that the documents you requested have indeed been destroyed. There is a hand written notation that says "disposal authority 10/88" next to decryption on the form. Sorry to say, but I guess those records are gone."
  122. Ernest R. Bryan, "The Tumor Clinic of the Baltimore Marine Hospital," *Public Health Reports*, 1940, 55: 2195-99.
  123. Ora Marshino, "Administration of the National Cancer Institute Act, August 5, 1937, to June 30, 1943," *Journal of the National Cancer Institute*, 1944, 4: 429-43, on p. 437.
  124. "Hillman Keeps Pace with Medical Advances," *Birmingham Post*, 7 May 1941, p. 7.

125. "Free Cancer Clinic Announced at Colorado General Hospital," *Denver Post*, 4 July 1926, p. 9.
126. "Bonfils Foundation Provides Fund for Free Tumor Clinic," *Denver Post*, 6 October 1937.
127. "Are You Sure You Haven't Cancer?" *Rocky Mountain News*, 24 February 1946, p. 32.
128. "Are You Sure You Haven't Cancer?" *Rocky Mountain News*.
129. Rosahan, "Summary of Experiences with Malignancies at New Britain General Hospital," p. 405.
130. William Stone in "Seventh Meeting of the Association [of Connecticut Tumor Clinics] held at Norwalk Hospital, Norwalk, December 15, 1937," *Journal of the Connecticut State Medical Society*, 1938, 2: 144-47, p. 144.
131. L. P. Hastings (Chairman) and C. J. McCormack (Medical Secretary), "Report of Tumor Committee," in *Forty-Second Annual Report of St. Francis Hospital, Hartford, Conn., Conducted by Sisters of St. Joseph, Year 1939* (Hartford, Connecticut: Calhoun Press, 1940), p. 27. (Copy in St. Francis Hospital and Medical Center Archives, Hartford, Connecticut.)
132. Louis P. Hastings (Chairman), "Report of Tumor Group Committee," in *Thirty-Eighth Annual Report of St. Francis Hospital, Hartford, Conn., Conducted by Sisters of St. Joseph for the Year 1935* (Hartford, Connecticut: Calhoun Press, 1936), p. 54. (Copy in St. Francis Hospital and Medical Center Archives.)
133. "Stamford Hospital Grows From Tiny Unit in 49 Years," *Tercentenary Edition, Stamford Advocate*. Stamford Hospital archives, A 380, Stamford, Connecticut.
134. Glenda Major, *Paid in Kind: The History of Medicine in Troup County, 1830-1930* (LaGrange, Georgia: Troup County Historical Society, 1989), p. 224. "Callaway to Head New Cancer Clinic in Troup Hospital," unattributed clipping dated 19 June 1938, in Dr. and Mrs. Enoch Callaway Collection, 1906-1975, MS 62, Box 5, "Callaway, Enoch, Dr. Scrapbook," Troup County archives, LaGrange, Georgia. The article "Cancer Clinic Helping Curb Nation's Most Dread Disease," *LaGrange Daily News*, 4 June 1952, pp. 1 & 6, suggests that a clinic was founded in 1923. However, this may be a reference to an earlier clinic founded by Dr. Enoch Callaway for the relief of indigent patients—this clinic treated cancer patients but may not have specialized in cancer. See Major, *Paid in Kind*, pp. 223-24.
135. "New Cancer Facilities," *Journal of the American Medical Association*, 1937, 109: 880.
136. On the original loan, see the Minutes of the 2 October 1939 Meeting of Board of Trustees of the Queen's Hospital. My thanks for this reference to Leilani Marshall, Reference Librarian/Archives, Mamiya Medical Heritage Center, Hawaii Medical Library, Honolulu.
137. *Seventy-Second Annual Report of the Queen's Hospital* (to 31 December 1931) (Honolulu: Hawaii Printing Company, 1932), p. 23.

138. John G. Raffensperger, ed., and Louis G. Boshes, assoc. ed., *The Old Lady on Harrison Street: Cook County Hospital, 1883-1995* (New York: Peter Lang, 1997), p. 175.
139. "City Hospital Given Radium Worth \$7000," *Indianapolis News*, 18 March 1940.
140. Hale, *Caring for the Community: The History of Wishard Hospital*, p. 79.
141. "Treat Cancer Here in Fall," n.d. (probably July 1939), Clippings file, Protestant Deaconess archives. "Local Hospital Chosen as Site of Cancer Clinic," *Evansville Courier*, 7 July 1939.
142. "Cancer Clinic Gets \$6,000 in Radium," *Wichita Beacon*, 14 November 1939.
143. The clinic opened on 3 April 1937. "Cancer Clinic Gets \$6,000 in Radium," *Wichita Beacon*.
144. T. C. Carroll, "Cancer Clinics in Kentucky," *Bulletin of the [Kentucky] Department of Health*, March 1946, 18 (8): 554-55, p. 554.
145. The clinic opened 19 May 1932. "Outline of a Procedure Followed by the Tumor Clinic of St. Joseph's Infirmary, Louisville, Ky," *Bulletin of the American Society for the Control of Cancer*, February 1933, 15 (2): 6. "St. Joseph Infirmary Dedicates Cancer Unit," *Courier-Journal* (Louisville), 15 August 1948. Carroll, "Cancer Clinics in Kentucky," p. 554.
146. On the original loan, see "Monthly Staff Meeting, Hospital News, Etc.," *Shreveport Charity Hospital Review*, 1940, 1: 1.
147. According to a letter from the NCI to Senator Bone, the Johns Hopkins Hospital had had no radium of its own by 1939. It had relied on radium emanations and radium from private owners. Anon. to Homer T. Bone, 16 February 1939, AR002321, NCI Archives.
148. Note that while the Johns Hopkins cancer clinic only achieved recognition in 1939, the Howard A. Kelly Hospital (founded 1904) had an ACS recognized clinic from 1933 to 37.
149. J. Mason Hundley, Jr. and Grant E. Ward, "Oncological Clinic of the University of Maryland," *Bulletin of the School of Medicine, University of Maryland*, 1939, 23: 169-74
150. *Annual Report of the Trustees of the City Hospital of the City of Worcester for the Year Ending December 31, 1939*, 1940, p. 5. Note that whereas the 1939 report uses the term "establishment" to describe the formation of the clinic, the 1941 report claims that it was "reorganized" in 1939. *Annual Report of the Trustees of the City Hospital of the City of Worcester for the Year Ending December 31, 1941*, 1942, p. 3.
151. Hospital Association annual meeting minutes, A series of the Barnard record group, 22 January 1940. My thanks to Paul Anderson, archivist of the Washington University Medical School, for this information.
152. "Barnard Hospital to Accept Radium Loan," *Globe* (St. Louis), 1 September 1939. Untitled clipping from *Kansas City Star*, 22 July 1939, Kansas City (Missouri) Public Library, Special Collections, Newspaper Clippings File.

153. Untitled clipping from *Kansas City Star*, 2 October 1938, Kansas City (Missouri) Public Library, Special Collections, Newspaper Clippings File. On the clinic, see also Mary Cecile Sutton, "A History of the Kansas City, Missouri, General Hospital" (Master's thesis, University of Chicago, 1946), pp. 42-43. Copy available in University of Missouri, Kansas City, Health Sciences Library.
154. "Barnard Hospital to Accept Radium Loan," *Globe* (St. Louis), 1 September 1939.
155. "Barnard Hospital to Accept Radium Loan," *Globe* (St. Louis).
156. *Seventh Biennial Report of the Board of Managers of the State Eleemosynary Institutions to the Fifty-Eighth General Assembly of the State of Missouri for the Two Fiscal Years beginning January 1, 1933, and Ending December 31, 1934* (Jefferson City: State of Missouri, 31 December 1934), pp. 39-40 (Missouri State Archives: Box titled "Reports of Eleemosynary Institutions").
157. *Eighth Biennial Report of the Board of Managers of the State Eleemosynary Institutions to the Fifty-Ninth General Assembly of the State of Missouri for the Two Fiscal Years beginning January 1, 1935, and Ending December 31, 1936* (Jefferson City: State of Missouri, 31 December 1936), pp. 31-32 (Missouri State Archives: Box titled "Reports of Eleemosynary Institutions").
158. I am grateful to Deborah Kraut who found this information in the material on the Beth Israel Hospital in the archives of the Jewish Historical Society of Metrowest. According to an article in the *Jewish Chronicle*, 13 December 1929, p.1, the clinic opened 9 December 1929.
159. *Annual Report of the Newark City Hospital (Department of Public Works) City of Newark, New Jersey, for the Year Ending December 31, 1939*, p. 11.
160. "Hospital Gets Radium," *Philadelphia Evening Bulletin*, 25 September 1939; "Uncle Sam Lends Radium," *Philadelphia Evening Bulletin*, 24 October 1939.
161. *Vassar Brother Hospital, Poughkeepsie, N.Y., Annual Report for the Year Ending December 31, 1938*, pp. 11-12.
162. Earle G. Brown, "Aftercare for Cancer Cases in the University of Michigan School of Public Health," in *Proceedings of Inservice Training Course on Cancer Services for Health Directors and Public Health Nurses. January 26, 27 and 28, 1948* (Ann Arbor, Michigan: University of Michigan School of Public Health, 1948), pp. 103-9, on p. 105
163. "Hospital Gets \$6,000 in Radium," *Democrat and Chronicle* (Rochester), 26 September 1939.
164. Report of the Dean of the School of Medicine and Dentistry, *Annual Reports of the President and Treasurer to the Board of Trustees of the University of Rochester, August, 1931* (Rochester, New York: The University, 1931), p. 141.
165. *The First Twenty Years: A History of the Duke University Schools of Medicine, Nursing and Health Sciences, and Duke Hospital, 1930-1950* (Durham, North Carolina: Duke University Press, 1952), p. 17. See also "Educational Service Stressed by Duke Hospital," *Durham Herald-Sun*, 21 July 1940, Section 1, p. 5.

166. Correspondence on this loan is in "Radium, Use of NCBH (1941-1956)," Dorothy Carpenter Medical Archives, Wake Forest University Baptist Medical Center.
167. A tumor clinic supported by the Forsyth County Unit of the ACS Field Army was established 4 April 1944. Gertrude Jones, *North Carolina History of the American Cancer Society* (Raleigh, North Carolina: North Carolina Division of the American Cancer Society, 1966), pp. 8-9. A photograph of a plaque commemorating this event is in *The Gray and White Matter* (published by students of the Bowman Gray School of Medicine of Wake Forest College and North Carolina Baptist Hospital School of Nursing, Winston-Salem, North Carolina, 1947), p. 13. The clinic is also mentioned in Wake Forest College, The Bowman Gray School of Medicine, *Report on the First Five Years of Operation and Recommendations to the President, Advisory Council and Board of Trustees*, 30 June 1945, pp. 37-41, Dorothy Carpenter Medical Archives, Wake Forest University Baptist Medical Center.
168. "Hospital Gets Radium," *Philadelphia Evening Bulletin*, 25 September 1939. "Uncle Sam Lends Radium," *Philadelphia Evening Bulletin*, 24 October 1939.
169. Sister M. Francis de Sales (Superintendent) to his Eminence the Cardinal, the Right Reverend Bishop and to Members of the Board of Directors of the Misericordia Hospital, "Annual Report of the Misericordia Hospital for 1933," in Cardinal Dougherty Collection, Group 80.00, Shelf G-5, Box 1, file 80.8588, Philadelphia Archdiocesan Historical Research Center, Philadelphia, Pennsylvania.
170. A 1938 report fails to mention the existence of a cancer clinic, but one in 1940 notes that a cancer clinic meets at 4 p.m. on Wednesdays, by appointment only. "Procedures for Admissions of Charity in General Hospital," *Bulletin of the Greenville County Medical Society*, 1938, 1: 117 & 122-24; "Clinic Schedule at Greenville General Hospital," *Bulletin of the Greenville County Medical Society*, 1940, 3: 127.
171. "Tumor Clinic Rated Among Best," *Chattanooga Times*, 4 March 1959.
172. Wanda V. Poole and Susan S. Sawyer, *The Baroness Collection: Erlanger Medical Center, 1891-1991* (Chattanooga, Tennessee: Erlanger Medical Center, 1993), p. 142. "Erlanger's New Cancer Clinic Gets Approval," *Chattanooga News-Free Press*, 20 October 1940.
173. Margaret Sanders, "Aged and Despairing Victims Get New Hope, Life in Modern Miracle," *Tennessean* (Nashville), 8 August 1943.
174. Charles L. Martin, "The Value of Tumor Clinics," *Southern Medical Journal*, 1938, 31: 1255-61, p. 1257.
175. *Second Annual Report of the Vermont State Cancer Commission for the Year Ending June 30, 1941*, p. 13.
176. This clinic was created 1 July 1939: *First Annual Report of the Vermont State Cancer Commission for the Year Ending June 30, 1940*, pp. 3-4, 11-12.
177. *First Annual Report of the Vermont State Cancer Commission for the Year Ending June 30, 1940*, p. 5.

178. This clinic, like that of the Mary Fletcher clinic, was created 1 July 1939: *First Annual Report of the Vermont State Cancer Commission for the Year Ending June 30, 1940*, pp. 3-4, 13.
179. "Hospital Gets Radium," *Philadelphia Evening Bulletin*, 25 September 1939. "Uncle Sam Lends Radium," *Philadelphia Evening Bulletin*, 24 October 1939. H. A. Cowardin to O. F. Northington, 8 June 1956, "Tumor Clinic," Sanger Historical Files, Special Collections and Archives, Tompkins-McCaw Library, Virginia Commonwealth University, Richmond, Virginia.
180. H. A. Cowardin to O. F. Northington, 8 June 1956, "Tumor Clinic," Sanger Historical Files, Special Collections and Archives, Tompkins-McCaw Library, Virginia Commonwealth University.
181. H. A. Cowardin to O. F. Northington, 8 June 1956. See also *Bulletin of the Medical College of Virginia, Session 1938-39*, 15 June 1939, 36 (12): 11, and "Director's Report. Hospital Division. July 1, 1937 to June 30, 1939," *Bulletin of the Medical College of Virginia*, September 1939, 34 (13): 10.
182. "Radium to be Furnished to Local Hospital," *Seattle Times*, 23 July 1939.
183. "Seattle to Have \$150,000 Radium, X-ray Institute," *Seattle Times*, 8 July 1932. See also "Dr. Padelford's Remarks at Ceremonies Opening High Voltage X-ray Laboratory," and two undated reports one beginning "Gov. Clarence T. Martin..." and the other entitled "The Governor," Unpublished Manuscripts, Tumor Institute Clippings Book, Swedish Hospital Archives, Seattle, Washington.
184. *The Birth of a Medical Center: A History of CAMC* (Charleston, West Virginia: Published for the CAMC Foundation by Pictorial Histories Publishing Company, 1988), pp. 35-36. The hospital began to mention this clinic directed by J. Ross Hunter in its advertisements in 1938. See *West Virginia Medical Journal*, November 1938, 34 (11): xxiii. It was named "Mountain State Hospital Memorial Cancer Clinic" in 1939; see, for example, the advertisement in *West Virginia Medical Journal*, December 1939, 35 (12): xv. Ross Hunter had had a supply of radium of his own which he advertised in the directory of physicians in limited practice; see, for example, *West Virginia Medical Journal*, March 1935, 31 (3): xxxiii.