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Article abstract

During World War II the original Associate Committee on Medical Research and three additional committees (each associated with a branch of the military) of the National Research Council organized wartime medical research. The war provided an opportunity for the NRC to demonstrate the utility of medical research and the ability of Canadians to make significant contributions to the allied research effort.

THE ASSOCIATE COMMITTEES ON MEDICAL RESEARCH OF THE NATIONAL RESEARCH COUNCIL AND THE SECOND WORLD WAR

Terrie M. Romano¹

Abstract

During World War II the original Associate Committee on Medical Research and three additional committees (each associated with a branch of the military) of the National Research Council organized wartime medical research. The war provided an opportunity for the NRC to demonstrate the utility of medical research and the ability of Canadians to make significant contributions to the allied research effort.

Résumé

Durant la seconde guerre mondiale, le premier Comité associé de recherches médicales ainsi que trois autres comités du Conseil national de recherches du Canada (chacun associé à l'une des armes) ont mis sur pied un programme de recherche médicale relié aux besoins de la guerre. Le CNR avait ainsi l'occasion de démontrer la pertinence de la recherche médicale et la capacité des chercheurs canadiens à fournir un apport significatif à l'effort de recherche des alliés.

On 22 March 1939 Charles Macklin wrote to Frederick Banting to support the idea of a committee under the Department of National Defence to co-ordinate medical war research. Macklin, a professor of embryology and histology at the University of Western Ontario, was hopeful that this development might lead to funding for his project studying the effects of gas on lungs. He wrote, in a statement that referred both to his superiors at Western and Canadian officials in general,

Now that the war clouds are black in Europe we should all get on with all such good work with all speed. Perhaps the delay at this end is only a sort of natural inertia. It may be that when the powers that be, here, get really going that they will do something really worth while.²

- 1 History of Medicine, Yale University School of Medicine, PO Box 3333, New Haven, CT 06510-8015.
- 2 C. Macklin to F. Banting, 22 March 1939. Banting Papers (BP), Canada Institute for Scientific & Technological Information, Ottawa (CISTI).

The powers that be did get going and an impressive *amount* of medical research was produced by Canadians during the Second World War, although whether it was all really worth while is debatable. Nonetheless, the quantity was such that the Associate Committees on medical research were the only committees of the National Research Council of Canada to get their own, separate war histories 'because of the great amount of medical research.'³

In this paper I discuss primarily the effects of the war on the organization and funding of medical research in Canada. I will briefly discuss some of the actual research carried out under the various associate committees of the National Research Council (NRC), but in my opinion the lasting effect of the war was organizational - most of the war-time research projects were related to solving specific problems and were therefore shut down after the war. The personnel recruited often remained in research. The most tangible result of the war was the increase in funding. Less tangibly, the war was an opportunity for research-minded Canadians to demonstrate both the utility of medical research and the ability of Canadians to produce it. Ironically the war also distracted Canadian scientists away from the basic research problems they had originally set out to do. After the war, supporters of medical research in Canada were left with the task of attempting to maintain war-time funding levels and retain the personnel who had been mobilized, while changing the nature of the research from mainly 'applied' to mainly 'pure.'⁴

Traditionally medicine is seen as a beneficiary of war; under the pressure of war, great strides forward occur.⁵ The story of the Associate Committees on Medical Research of the NRC is usually related in this vein; under the pressures of World War II Canadians were galvanized and the result was that for the first time large numbers of Canadian medical investigators were doing penetrating, important research. There are problems with this account, if only because it is clear that there was medical research in Canada long before the Second World War.⁶ And

- 3 National Research Council of Canada, *War History of the Associate Committees of the National Research Council* (Ottawa, 1946), preface.
- 4 Wilfrid Eggleston, *Scientists at War* (Toronto, 1950), 255 briefly discusses some of these issues.
- 5 Roger Cooter, 'Medicine and the Goodness of War,' *Canadian Bulletin of Medical History* 7 (1990), 147-59 offers a challenge to the traditional account of the relationship between medical research and wartime experience.
- 6 For accounts of Canadian medical research before the Second World War, see for example, Michael Bliss, *The Discovery of Insulin* (Toronto, 1982), and S.F. McRae, 'The "Scientific Spirit" in Medicine at the University of Toronto, 1880-1910,' (unpublished PhD dissertation, University of Toronto, 1987).

the Associate Committee on Medical Research was begun before the war.⁷ The war did speed up the process of organizing and funding medical research in Canada, but the acceleration was due to those Canadians who had long hoped to organize and better fund medical research. They seized the opportunity that the war provided. In particular the formation of the Associate Committee on Medical Research in 1938 occurred only after careful maneuvering by Sir Frederick Banting and A.G.L. McNaughton, President of the National Research Council, to garner support from potential allies (or enemies), including the universities and the medical profession.⁸

It is true that the budget requested for 1938-39 for the committee was a paltry \$7,500, which was raised to \$55,000 for the year 1939-40. But the budget increase was due to the addition of the tuberculosis committee, with its own \$25,000 budget, and the coincidence that the first active year of the committee came as the war began. There is some confusion about the early funding of the committee; most sources date the founding of the committee from 1938 and then state that the first year of funding was around \$50,000. I think this confusion arises because the budget years differed from calendar years and although the committee's inception was 1938, its first active year was 1939-40.⁹

Dr Wodehouse, the Deputy Minister of Pensions and National Health, had suggested that Canada immediately organize a Medical Research Council with a budget of \$100,000 or at least \$50,000, as early as 1937. President McNaughton of the NRC disagreed. He was in favour of a gradual process, reporting 'I told Dr. Wodehouse that I had long regarded the Medical Research Council as an ultimate objective but that it was my view that this result could most certainly be achieved by a process of evolution.'¹⁰

- 7 C.B. Stewart, 'Reminiscences on the Founding and Early History of Medical Research Council,' *Annals RCPSC/Annales CRMCC* 9:5 (Sept. 1986), 385-389, (Part 1) and 9:6 (Nov. 1986), 471-473, (Part 2), and G.H. Ettinger, *History of the Associate Committee on Medical Research* (Ottawa, 1938-46) both concur that the committee began in 1938.
- 8 Michael Bliss, *Banting, a Biography* (Toronto, 1984), 232. Ettinger, *History*, 6-7 and Stewart, 'Reminiscences,' 386-387 describe the events leading up to the formation of the Associate Committee in 1938; some of the meetings are also documented in BP, CISTI.
- 9 BP, CISTI, Memorandum, A.G.L. McNaughton, President, NRC, 'Reporting conversations and discussions on the subject of the proposed organization of an Associate Committee on Medical Research,' 8-11 September 1937, stated that \$7,500 were requested in the draft estimates for 1938-39. Stewart, 'Reminiscences' states that the first budget was \$55,000 of which \$25,000 was from the old Associate Committee on Tuberculosis, which became a part of the new associate committee. Ettinger, *History*, 1, states that 'a budget of nearly \$53,000 was allocated in the first year.'
- 10 Memorandum, A.G.L. McNaughton, 'Reporting conversations..., ' 8-11 September 1937.

In 1939, Banting wrote to Wilder Penfield, Professor of Neurology and Neurosurgery at McGill, stating,

The meeting of the Associate Committee on Medical Research is being arranged to take place on February 26th and 27th. I think two days will be necessary, because there are so many things to discuss. I had a note from Dr. Stewart yesterday and he said that up to the present, not counting fellowships, there have been requests for about \$125,000.00. There has thus been an awakening on the part of research workers which we must do our best to assist. You will remember that the Government was asked for approximately \$82,000.00, and I fear that we will not get all of this amount.¹¹

The long-term effect of the war on funding medical research has been exaggerated. The amount of funding granted the Associate Committee through the NRC during the war (by 1944-45 its budget was over \$100,000)¹² had not been of an inconceivable magnitude even in 1937. There were enough researchers already extant to try and claim \$125,000 at the beginning of the war.

In the short-term, however, the effect of the war on funding is less clear. During the war, there were three other medical associate committees of the NRC, each with their own budgets. The Associate Committee on Aviation Medical Research was supported initially by a special grant voted by the Privy Council on the recommendation of the Department of National Defence in 1939. From 1940 till the end of the war it was funded from the same department but through the National Research Council.¹³ The Associate Committee on Naval Medical Research was funded first as a subcommittee of the NRC by the Department of Naval Service, with its expenditure subject to the approval of the Associate Committee on Medical Research. After it became an Associate Committee, its funds were directed through the NRC and controlled by the Executive of the Associate Committee on Naval Medical Research until the end of the war.¹⁴ The Associate Committee on Army Medical Research was trustee for \$100,000 annually raised by the Director-General of Medical Services through the Army Technical Development Board.¹⁵ The total budget of these three committees is obscure. To further confuse the issue it is probable that some of the funds originated with the

11 F. Banting to W. Penfield, 1 February 1939. BP, CISTI.

12 Ettinger, *History*, 12.

13 Edgar G. Black (ed.), *History of the Associate Committee on Aviation Medical Research, 1939-45* (Ottawa, 1946), 17.

14 National Research Council, *History of the Associate Committee on Naval Medical Research* (Ottawa, 1948), 12-13.

15 National Research Council, *Medical Research and Development in the Canadian Army during World War II, 1942-46* (Ottawa, n.d.), 3.

War Technical and Scientific Development Committee (later the Banting Fund), informally dubbed the Santa Claus Fund. In 1940 this secret fund totalled over \$1.3 million dollars, donated mainly by corporations, and was initially the main source for the NRC's war-research projects.¹⁶ Although it is not possible to arrive at a total budget for medical research during the war, it is clear that the money available was much greater than that before the war. But the long-term effect of this funding for medical research was modest as the only committee and budget that remained after war's end was that of the original Associate Committee on Medical Research.¹⁷ Much of the war-time funding was used to pursue projects of dubious scientific merit or with little potential to assist in the establishment of medical research in Canada.

Even before the outbreak of war, McNaughton, as President of the NRC (who was also a Major-General), made speeches that emphasized the necessity of research for strong, internationally competitive industry - the prerequisite for an effective military. In his opinion this was the lesson that Germany had taught the allies in World War I. In Canada the lesson had resulted in the formation of the National Research Council during the war.¹⁸

As war threatened in Europe, the Associate Committee on Medical Research of the NRC (Banting in particular) began campaigning to be sure that medical research was to be part of the war effort. On 1 September 1939 Germany invaded Poland, and Banting wrote an extensive memorandum outlining potential medical research needs during the war he assumed was imminent. His sweeping suggestions were organized under the categories of: Chemical Warfare, Bacteriological Warfare, Neurophysiological research and Chemotherapy. He suggested that the research take place in 3 locations: 1. 'advanced observation units,' 2. 'main medical research unit' for the military and 3. 'Canadian (Base) Medical Research Unit.' He volunteered his own Department of Medical Research at the University of Toronto as the Canadian (Base) Medical Research Unit.¹⁹ Banting forwarded his suggestions to McNaughton on 2 September, as

16 See Bliss, *Banting, a Biography*, 286 for the use of the term 'Santa Claus fund' and John Bryden, *Deadly Allies: Canada's Secret War, 1937-1947* (Toronto, 1989), 40-43 for an account of how the fund began and the role it played in funding germ warfare research in Canada.

17 Although apparently a reduced Army Medical Research Committee did carry on for some time after the war. *Medical Research and Development in the Canadian Army*, 87-88.

18 See for example, BP, CISTI, 'Research in Canada' Address by A.G.L. McNaughton to Canadian Society of Cost Accountants & Industrial Engineers, September 29, 1937.

19 See 2 versions of memorandum, BP, CISTI, 'Proposed Organization, wartime division of medical research' and 'Proposed Medical Research Unit from Department of Medical Research of

possibilities should 'Canada and the Empire be engaged in war.'²⁰ Two days later McNaughton passed the letters along to H.H. Matthews of the Department of National Defence (Militia Service).²¹

Matthews politely responded,

An army in the field is not without considerable resources for the investigation of such special medical problems as may occur from time to time. Any medical unit comprises men with varied and often extensive qualifications. A force has consultants who are recognized authorities in the various branches of medicine. There are laboratory facilities in the General Hospitals and present arrangements envisage a mobile bacteriological laboratory with any Canadian force.

More bluntly he continued,

I, however, confess that at present I am unable to visualize any problem which would require the attention of such a research unit. I can appreciate that medical problems will arise constantly regarding methods of treatment of conditions encountered. However, I feel that this problem must be attacked by the medical men in charge with the advice and co-operation of the Consultants, if necessary co-ordinated by an executive Medical Officer. It appears to me that the problem can be appreciated by such an organization as well as by an organization trained in research work.²²

This statement denied any need for the role that Banting and others had been assiduously cultivating for medical researchers in the event of war. (At this point the war was no longer an eventuality. Matthews' reply was dated 11 September, the day after Canada officially declared war against Germany.) The Associate Committee ignored this opinion and its Executive set about to fulfil a need for medical research that had not yet been recognized. They were simultaneously creating a role for themselves and filling that role. As the war began the Associate Committee rushed to offer its assistance for the war effort in direct defiance of Matthews' opinion. On 26 September, McNaughton widely circulated a memorandum stating that,

the committee desires to place its service wholly at the disposal of the Government in the present emergency, and to state that the members of the committee are of the opinion that medical research problems, both as regards military activities and the protection and welfare of the civilian popula-

University of Toronto, 1 September 1939.

20 F. Banting to A.G.L. McNaughton, 2 September 1939. BP, CISTI.

21 See A.G.L. McNaughton to F. Banting, 4 September 1939. BP, CISTI. McNaughton acknowledged Banting's letter and stated that he had forwarded the letter to H.H. Matthews, Major-General, Department of National Defence (Militia Service) Canada.

22 H.H. Matthews to Director-General of Medical Services, 11 September 1939. BP, CISTI.

tion in so far as they may be affected by war conditions, might advantageously be referred to the committee for consideration and advice.²³

Banting was certainly optimistic despite Matthews' lack of enthusiasm. On November 6 he wrote to J.B. Collip, stating, 'I can foresee the great need of money for War Medical Research, and it might be wise to have a meeting of the Executive [of the Associate Committee] within a month or so for this purpose.'²⁴

At a 'Meeting of a Special Committee of the National Research Council to consider Special Training of Technical Men for the probable needs of the Military Services and Industries,' Banting was quick to raise medical issues. He noted that 'in Germany special courses had been given in medicine in its application to war for the last two years at least.' He acknowledged that the Associate Committee had not given medical schools advice about such courses 'since the functions of the Committee related to medical research only,' but by raising the issue of medical treatments to be used in war he underlined the importance of war medical research. And it was agreed that Banting should meet with the Deans of Canadian medical schools to organize medical courses to assist the war effort.²⁵

Banting's reference to German superiority was a common refrain within the NRC, in this case applied to medical matters. The threat of German science and technology, particularly as demonstrated in World War I, was commonly cited by the NRC to galvanize support for scientific research in Canada. McNaughton had reminded his listeners in 1937 about German research and the role it had played in World War I. With the onset of war the rhetoric did not change. Instead the NRC no longer had to point to its potential role in some war but could emphasize the role it had to play in this war. 'Research as a National Asset in Peace and War,' a 1939 address by S.P. Eagleson, Secretary-Treasurer of the NRC, was not diffident about associating victory in war with basic research. He again reminded Canadians of how Germany had almost won World War I because of its clear leadership in the application of science to industry.²⁶ I do not

23 Letter, A.G.L. McNaughton, 26 September 1939, BP, CISTI, sent to Banting for his information, sent to Deputy Minister, Dept. of National Defence, Deputy Minister, Dept. of Pensions and National Health, Deputy Minister, Department of Labour, Dr. E.H. Coleman, Under-Secretary of State, Secretary of State Dept. (Voluntary Service Registration Bureau), Members of the Associate Committee on Medical Research, Heads of all Canadian universities.

24 F. Banting to J.B. Collip, 6 November 1939. BP, CISTI.

25 BP, CISTI, 'Minutes of a Special Committee of the National Research Council to consider Special Training of Technical Men for the probable needs of the Military Services and War Industries,' n.d.

26 BP, CISTI, S.P. Eagleson, Secretary-Treasurer, National Research Council, 'Research as a Na-

dispute the importance of research to German industry in World War I or the sincerity of these statements by NRC officials. However, I want to emphasize that the NRC saw its role as explaining and justifying research to Canadians as well as funding research by Canadians. Thus the war offered a perfect opportunity for the NRC to fulfil its entire mandate. The Associate Committee on Medical Research sought to fulfil the same mandate for medical research, a field they saw as a disadvantaged late-comer to the Canadian research community; for the committee the war was an opportunity to establish medical research in Canada. During the war medical research came to be organized under four associate committees of the NRC. There was the original Associate Committee on Medical Research and later the three committees named above, each associated with a branch of the military. The naval and aviation committees were both outgrowths of research initiatives of the original Associate Committee.

The Committee on Aviation Research had its origins before the war. Banting took up the 1938 suggestion of Major A.A. James of the Royal Canadian Medical Corps that his department carry out such research. Members of the Banting and Best Department of Medical Research, University of Toronto, did draw up research programs. But in addition, Banting decided to organize such a research program nation-wide. A subcommittee had its first meeting under the authority of the Department of National Defence in June of 1939.²⁷ The committee set up a liaison between itself, the main Associate Committee and the Royal Canadian Air Force Medical Branch - the liaison being Banting himself, the chair of both committees and the official liaison person.²⁸ In 1940 this committee was re-constituted as an Associate Committee; its subcommittee chairs became members of the new Associate Committee and its Executive. The first laboratory was the Banting and Best Department of Medical Research at Toronto; the research was later extended to other departments at Toronto, including Physics and Psychology. Other universities that were involved were: University of Western Ontario (Medical School), University of Alberta (Dept. of Biochemistry), McGill (Neurological Institute and Dept. of Physics). The Ontario Research Foundation and the NRC labs as well as the new RCAF centres of aviation medical research at Regina, Toronto, Belleville and Halifax were also utilized.²⁹

tional Asset in Peace and War,' Address to Rotary Club of Ottawa, 2 October 1939.

27 *History of the Associate Committee on Aviation Medical Research*, 3.

28 *Ibid.*, 6.

29 *Ibid.*, 20-21.

In 1941 the Associate Committee had decided it should inform the Services of their activities and they had solicited the appointment of Medical Officers from the Navy and Air Division as special representatives on the Committee (The Army already had a special representative on the committee.)³⁰ At this point Drs Best and Solandt were already doing research on seasickness. Discussions about this research and support from the naval authorities led to the formation of the subcommittee on naval medicine and Dr Best was named its first chairman.³¹ In the fall of 1941 Drs Best, Solandt, Campbell and Mr Cowan, all of the University of Toronto, entered the Naval service, where they continued their research. The Navy set up the Royal Canadian Navy Medical Research Unit, under the Medical Director-General. Best was the director.³² In 1942 this Unit became the chief working unit of the Associate Committee on Naval Medical Research in response to a request from the Director General Medical Services (DGMS) to set up an Associate Committee on Army Personnel Medical Research.³³ Research was carried out at the University of Toronto (Depts. of Physiology and of Physiological Hygiene, Banting and Best Dept. of Medical Research), McGill (Neurological Institute, Dept. of Physiology), Dalhousie (Dept. of Physiology), NRC, Ontario Research Foundation and at HMCS 'Stadacona' and 'Cornwallis'.³⁴

The Army Medical Research committee was a late thought; it was created in 1942 due to the efforts of Major-General Chisholm, the new DGMS and Brigadier J.C. Meakins, who came in as Deputy Director General. A Research and Development Branch of the DGMS was begun along with the new Associate Committee on Army Medical Research of the NRC.³⁵ I associate this committee with J.B. Collip: he was its liaison to the United States and it began under his direction of the Associate Committee.³⁶ The Army committee carried out research at universities and hospitals in Canada and did several projects abroad.

30 **History of the Associate Committee on Naval Medical Research, 2.**

31 *Ibid.*, 3-4.

32 *Ibid.*, 5.

33 *Ibid.*, 13.

34 *Ibid.*, 13.

35 **Medical Research and Development in the Canadian Army During World War II, 1-2.**

36 *Ibid.*, 82.

So by 1942 there were four Associate Committees on Medical Research. The four committees had not been created under any grand scheme - each creation was almost ad-hoc. I suspect the committees were created in part to increase the funding for medical research. The committees reflected the politics of medical research in Canada: I do not think it is a coincidence that each of the three Canadians who discovered insulin had prominent roles. There had been undercurrents between Best, Banting and Collip in the early days of the war. Best was slighted when Banting (and Israel Rabinowitch) was chosen to travel to Britain despite Best's personal connections and the advance arrangements he had made.³⁷ And Collip, Acting Chairman of the Associate Committee in Banting's absence, had been irritated not to have been officially informed by Rabinowitch of his return from England.³⁸ These disagreements were smoothed over at the time and were forgotten after Banting's death. But harmony was maintained partially by the emergence of independent roles for each of them within the wartime organization. Banting chose Collip to be his replacement when he was absent (which was frequently) and Best was involved in naval research. The committees also demonstrated the rivalry between the branches of the armed forces. Once the air force had a research division the navy became interested; and once the air force and the army had associate committees the navy had to have one as well.

There were fears at the time that the work of the four committees would overlap so their work was integrated through a co-ordinating committee, the chairman of which was the Chair of the Associate Committee on Medical Research.

Another layer of organization related to war-time collaboration. The Canadians did not want their work to overlap with their allies' research either. Canada certainly looked to Britain. The original discussions about whether or not to form a Canadian Medical Research Council had been assuming that the model to follow was the British Medical Research Council which had been founded in 1920. The first projects of the committees, particularly on aviation medicine, came out of discussions Banting had with his British counterparts. The other natural collaborator if only because of geography, the United States, was initially less important because the Americans were officially neutral at the outset of the war which made the exchange of information difficult. With the fall of France, Britain

37 See the letters in BP, CISTI, particularly in file, 'NRC Canada Best, C.H. Re England 1939 Corr. Sept - Oct 1939.'

38 See C.J. Mackenzie to F. Banting, 6 March 1940, BP, CISTI, 'This is a personal, not an official note. Collip hasn't heard of Rabinowitch's return to Canada & thinks it strange as Collip was acting Chairman... during your absence...'

changed tactics and decided to exchange technical and scientific information with the United States in order to encourage their entry into the war.³⁹ Banting, at the request of the Americans, was appointed liaison with the U.S. for Canada and Great Britain for the exchange of scientific information on medical matters.⁴⁰ The Associate Committees collaborated with the Americans and Brits on specific projects, and they all pooled information. Initially information exchange occurred through visits among the countries and official representatives stationed in each country.⁴¹ It became clear that this was not an efficient mode of exchange and towards the close of the war conferences on specific topics were organized.⁴² In this collaboration Canada was treated and perceived itself to be an equal partner; this was an enormous boost to the morale of Canadian medical researchers - many of whom were embarking on their first research projects. The reports are full of statements like,

In this field [of night vision testing] Canada was well in advance of other nations when it came to practical applications, and her soldiers were given the benefit of the best that could be provided in the way of night vision training and selection. **This fact has been recognized and remarked upon by authorities in the United Kingdom and the United States.**⁴³

The aims of the Associate Committees were quite wide: they sought to collect and distribute medical intelligence; to stimulate research and development; to enlist the aid of Canadian medical schools and other civilian agencies in solving medical military problems; and to arrange the administrative details of such projects.⁴⁴ The amount of research produced, the number of different centres utilized and the collaboration achieved testified to the success of these committees in fulfilling their aims.

Each of the committees supervised a large number of projects. The four committees between them had over 80 different projects, with research in engineering,

39 Bryden, *Deadly Allies*, 45.

40 R.H. Fowler of NRC to F. Banting, 26 September 1940. BP, CISTI.

41 For example Wilder Penfield after his 1941 visit to Britain wrote a lengthy, 'Report to the Chairman of the Associate Committee on Medical Research and to the Chairman of the Associate Committee on Aviation Medical Research on A Visit to Great Britain August-September, 1941' (Ottawa, 1941).

42 Ettinger, *History*, 10-11.

43 *Medical Research and Development in the Canadian Army during World War II*, 11, my emphasis.

44 *Ibid.*, 2.

psychology, industrial medicine, bacteriology, physiology, surgery and nutrition. Tables 1-4 provide a sense of the amount of research and kinds of projects undertaken by the four associate committees. The titles of the projects indicate the wide range of subject matter. Examples include: 'Traumatic Injuries of the Nervous System,' 'Pemmican as an Army Ration' and 'Adjustment of Women to Army Life.' The original committee and the Aviation Committee, the two that pre-dated the war were further divided into subcommittees, and as a general rule tended to have more long-term projects and produce more theoretical and less empirical research. By empirical I mean research motivated by the chance to collect large amounts of data or research aimed at solving a very specific problem. For example, the 'Foot problems in the army' project of the Associate Committee on Army Medical Research examined the feet of large numbers of men on induction and after basic and then advanced training. It was hoped to spot the reason for foot ailments; according to the report, 'so many men were surveyed each day in this great undertaking that the X-ray tube had to be packed in dry-ice to prevent overheating.'⁴⁵ While foot problems are an important problem for any army this project illustrates what was wrong with much of the research done by the committees. Essentially the scientific method was applied to a problem (lots of data was carefully collected and studied) without proper regard to experimental design (the question under study was vague and thus it was not clear whether the data collected would ever answer it). In contrast, other 'empirical projects' were very worthwhile: the Committee on Aviation Medical Research developed RCAF Oxygen systems, modifying masks and the oxygen demand valve.

It is unquestionable that Canadian research was useful and Canada played an important role in war medical research. Canadians were involved in developing the large-scale production of penicillin - the most prominent medical advance of the war.⁴⁶ The Aviation Committee was among those pioneering the research of decompression sickness with the first low-temperature, low-pressure chamber in North America, built in Toronto in 1939.⁴⁷ But some of the research was risible, such as attempts to design mud shoes and find quinine in grapefruit seeds.⁴⁸ And while Canadians felt they were equals in research with the Americans and British, it is unlikely the feeling was mutual.

45 Ibid., 40.

46 Eggleston, *Scientists at War*, 232-233.

47 Ibid., 214, and *History of the Associate Committee on Aviation Medical Research*, 55-56.

48 Eggleston, *Scientists at War*, 249-250.

Nonetheless, these committees were extremely successful in fulfilling Banting's desire that they assist the awakening of interest in research in Canada. Many of the research centres and personnel were carrying out research for the first time. Each of the many projects required at least one principal investigator, and usually assistants and technicians as well. C.B. Stewart, the Associate committee secretary, stated that the work of the committees led to

an upsurge in the interest in research by faculty members and students which showed promise of development if adequate funding was provided. Largely because of the support of the Associate Committee on Medical Research and the other wartime associate committees and subcommittees a new generation of medical researchers had been recruited and trained. Many of these would not have been in medical research without the wartime experience.⁴⁹

These projects also involved many women in medical research. The reports list significant numbers of women as investigators and assistants. And many of the photographs in the reports feature women in compositions which mimic appliance advertisements.⁵⁰

The war allowed the men who began the Associate Committee on Medical Research to make a place for basic medical research in Canada. There had been some ambivalence about the appropriateness of basic research for Canada. This ambivalence was reflected by the NRC habit of referring to pure or more theoretical research as fundamental. The NRC's role was to proselytize about research, not merely fund it. McNaughton had stated in his 1937 speech, 'Recently the Secretary of one of our large associations wrote to me that 'the stage of convincing people that industrial research is useful and necessary is pretty well passed.' I wish I could agree with him.'⁵¹ And in 1939, Eagleson had stated,

It is important that we should have in mind a clear definition of science and research. There is probably a better general understanding of the meaning of these terms to-day than there was a few years ago when I received a letter from a lady who stated that her husband had disappeared sometime previously and that she had endeavoured to find him, but without success. Consequently she requested that the National Research Council make a research for him. I was obliged to inform her that this was beyond the scope of the Council's activities.⁵²

49 Stewart, 'Reminiscences,' 472.

50 These photographs may mimic advertisements more closely. It is possible that the women pictured were not those involved in research. The captions rarely name the women and D.C. Mortimer has suggested that they may have been recruited from behind typewriters for the photographs. D.C. Mortimer, personal communication.

51 McNaughton, 'Research in Canada.'

52 Eagleson, 'Research as a National Asset in Peace and War.'

The war was utilized frequently by NRC spokespersons to explain the importance of research. McNaughton stated emphatically that research was just as important as the armed forces for the continued health, safety and security of Canadians.

In the first discussions about what became the Associate Committee the scope of its activities had been unclear. Initially, the objective was not sponsoring research but rather the investigation of suspected 'quack' cancer cures being advertised in Canada.⁵³ By the time the Associate Committee had been created in 1938, this objective had been removed from its agenda because it would restrict the scope of the Committee.⁵⁴ World War II demonstrated that there was a corps of Canadians willing and able to do medical research if given the opportunity. However the war also narrowed the scope of the research done to that related to war. At the end of the war, the Associate Committee was left with the task of retaining the funds and personnel it had garnered during the war while changing course in order to support fundamental research.

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53 BP, CISTI, November 1936 Draft Proposals, 'The Organization of Medical Research in Canada.'

54 BP, CISTI, Statement for the Press, Associate Committee on Medical Research, Ottawa, 6 May 1938.

Table 1: Research Projects of Associate Committee on Medical Research, 1939-45

Subcommittee on Infections

gas gangrene and sulphonamide research

prevention of wound infection

penicillin

typhus vaccine

shiga dysentery immunity

influenza

Subcommittee on Shock and Blood Substitutes

blood storage

preparation of dried serum

isinglass

shock

Subcommittee on Surgery

burns

orthopaedic surgery

traumatic injuries of the nervous system

surgical radiology

plastic surgery

thoracic surgery

Subcommittee on Industrial Hygiene and Industrial Medicine

relation of Vitamin C intake and high fat diet to ability to withstand toxic effects of TNT

anaemia in women in industry

toxicity of uranium oxide

heavy metal poisoning

toxic hepatic cirrhosis

psychological aspects of return to civilian life

microchemical estimation of arsenic and a study of selenium in human body

relation of fatigue to exercise tolerance

effects of aluminum and aluminum oxide on lungs of animals

Nutrition

Corticosteroid Synthesis

Source of Drugs in Wartime

Peace-Time Projects

tuberculosis

arthritis and muscular dystrophies

cancer

heart and circulation

Table 2: Research Projects of Associate Committee on Aviation Medical Research, 1939-45

Subcommittee on High Altitude Medicine

acceleration

i. development of anti-G suit

ii. physiology of acceleration

decompression sickness

pressurized breathing

Subcommittee on Personnel Selection (originally Psychology)

psychological research in personnel selection

medical aspects of personnel selection

visual problems

motion sickness

Subcommittee on Oxygen Equipment

respiration

development of RCAF oxygen systems, oxygen masks, oxygen demand valve

development of liquid oxygen evaporator for use in aircraft

manual of oxygen and intercommunication equipment CAP 307

acoustics and intercommunication equipment

Subcommittee on Protective Clothing

properties of fabrics and other materials

physiological aspects of clothing

equipment development

Table 3: Research Projects of Associate Committee on Naval Medical Research, 1941-45

Subcommittee on Sea Sickness (only subcommittee)

Visual Problems Encountered in Naval Operations

Auditory Problems Presented by Naval Operations

Nutrition

Protection of Personnel from Excessive Noise

Life Saving Equipment

'Immersion Foot'

Traumatic and Burn Shock

Protective Clothing and Equipment

Optician Service

Carbon Monoxide Hazards

Special Equipment

Miscellaneous Problems

Environmental Control

Table 4: Research Projects of Associate Committee on Army Medical Research, 1942-46

Night Vision Training and Testing
 Evacuation of Casualties from the Field
 Bacteriostatic Fabrics
 Amoebiasis Survey
 Nutritional and Environmental Research
 i. examination of American, Canadian and British rations
 ii. pemmican as an army ration
 iii. ketonaemia and intestinal upsets
 iv. metabolism in damage and convalescence
 v. research team South East Asia Command
 vi. hydroponic vegetable growth
 vii. sprouted seeds as nutritional supplements
 Effort Syndrome
 Aural Damage and Rehabilitation
 Foot Problems in the Army
 Respiratory Disease Research
 Motion Sickness Remedies

Air Transport of Casualties
 Traumatic Injuries of the Nervous System
 i. peripheral nerve injuries
 ii. head injuries
 Army Industrial Hygiene and Occupational Disease Control
 Intra-arterial Pentothal Injections
 Blood Transfusion and Rh Sensitization
 Heparin and Fat Embolism
 Technical Advances in Surgery
 i. plastic substitute for plaster of paris cast
 ii. a self stabilizing triple-grip base for crutches
 Psychiatric Problems
 i. civilian readjustment of neurotic soldiers
 ii. adjustment of women to army life
 Entomological Projects
 i. plague survey 1943
 ii. head lice
 iii. disinfecting of stores
 iv. insect repellents
 v. mosquito survey