Russell Palmer: Forgotten champion

How victory in Holland launched the BC renal failure program

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The Netherlands recently celebrated the 65th anniversary of its liberation by Canadian Armed Forces on 5 May 1945 from Nazi Germany. These celebrations were attended by a dwindling number of Canadian veterans present on that historic day. It was a joyous occasion and the Dutch turned out in force.

One Canadian veteran missing was Lieutenant Colonel Russell Palmer (Retired), who died 22 December 1999, aged 94.[1] Dr Palmer's major contribution to the initiation and subsequent growth of our renal failure program, now the equal of any in Canada, is seldom remembered in his home province of British Columbia. Who was Russell Palmer?

Lt. Col. Russell Palmer obtained a BA from UBC in 1926 and an MD from McGill University in 1931, and was serving with the Royal Canadian Army Medical Corps in Kampen, Netherlands, at the time of the liberation. There he met by chance Dr Willem Kolff, a Dutch physician who had been trying for some years to develop a workable artificial kidney for patients with renal failure, something which despite many attempts had not been done successfully. After the Nazi invasion of 1940, Dr Kolff joined the Dutch resistance and was forced to continue his work in secret and in great danger, since some of his material, metal derived from downed aircraft, was wanted by the foe.

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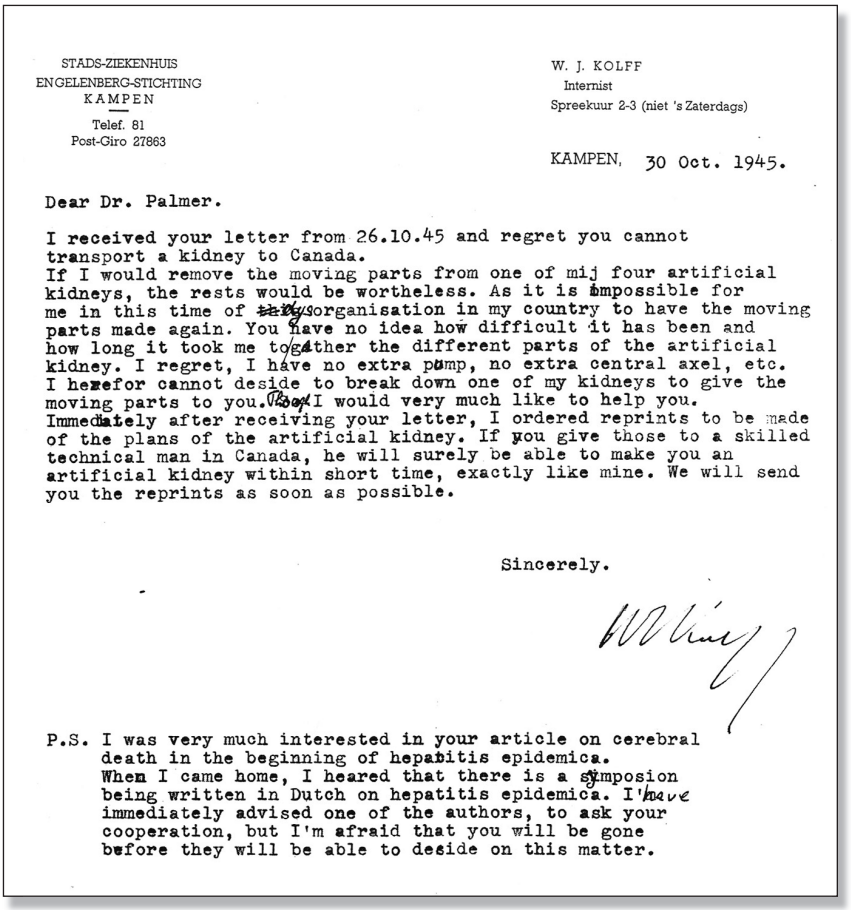

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W. J. KOLFF
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KAMPEN, 30 Oct. 1945.

Dear Dr. Palmer.

I received your letter from 26.10.45 and regret you cannot transport a kidney to Canada.
If I would remove the moving parts from one of mij four artificial kidneys, the rests would be wortheless. As it is impossible for me in this time of ~~hate~~ organisation in my country to have the moving parts made again. You have no idea how difficult it has been and how long it took me to gather the different parts of the artificial kidney. I regret, I have no extra pump, no extra central axel, etc. I herefor cannot deside to break down one of my kidneys to give the moving parts to you. Of course I would very much like to help you. Immediately after receiving your letter, I ordered reprints to be made of the plans of the artificial kidney. If you give those to a skilled technical man in Canada, he will surely be able to make you an artificial kidney within short time, exactly like mine. We will send you the reprints as soon as possible.

Sincerely.

P.S. I was very much interested in your article on cerebral death in the beginning of hepatitis epidemica. When I came home, I heared that there is a symposion being written in Dutch on hepatitis epidemica. I have immediately advised one of the authors, to ask your cooperation, but I'm afraid that you will be gone before they will be able to deside on this matter.

Figure. Letter from Kolff to Palmer offering to supply a blueprint for the machine that would enable Palmer's first life-saving hemodialysis in 1947.

Palmer given blueprint of Kolff's artificial kidney

When the Canadians arrived in 1945, Dr Willem Kolff, anxious to discuss his work with a physician from the liberating forces, was introduced to Dr Palmer who, as a general internist, had no special interest in the kidney and was unaware of attempts to create an artificial one; there was no precedent for a complex organ being replaced by a machine. With the aid of an interpreter, Dr Palmer immediately saw the significance of Dr Kolff's work and gratefully accepted the offer of a "reprint" (i.e., blueprint) of his rotating drum artificial kidney (**Figure**).

Dr Kolff had used his invention as early as 1943 in a variety of patients with renal failure but, despite technical success with the equipment, none of the patients survived; later several were shown to have had chronic irreversible disease, and Dr Kolff con-

cluded that this treatment was only indicated in those with the potential for recovery.

The first patient whose life Dr Kolff saved with his artificial kidney in September 1945 was a Nazi collaborator imprisoned in the local barracks.[2] She was moribund from uremia due to sulphonamide anuria following treatment for cholecystitis and septicemia; her kidneys recovered after treatment, and she lived for a further 7 years.

First successful hemodialysis with Kolff's machine

On return to Canada with Dr Kolff's blueprint, Dr Palmer had the rotating drum built by his brother, an engineer on Granville Island. Palmer's first life-saving hemodialysis using this equipment was carried out at Shaughnessy Hospital in Vancouver in September 1947.[3]

In 1946 Dr Kolff gave copies of his rotating drum artificial kidney to England, the United States, and Canada.[2] It was used several times in London in that year with indifferent results and abandoned in favor of dietary management. Dr MacLean in Montreal used it in 1948, as did the Americans in the same year;[4] hence Dr Palmer was the first to succeed with Dr Kolff's rotating drum in North America, and the fourth in the world, including Kolff's case mentioned above.

Soon after, the new UBC Medical School opened in 1950. Dr Palmer was named head of the Metabolic Unit at Vancouver General Hospital (VGH) for a short while with the rank of clinical assistant professor of medicine.

Dr Palmer used the rotating drum artificial kidney briefly at Shaughnessy Hospital and thereafter at VGH until 1957 with the assistance of Dr Edwin Henry, a research fellow in clinical investigation. In that time they obtained 10 years' experience of 54 patients with acute renal failure, 23 of whom were dialyzed with the rotating drum, 12 of whom survived.[5,6]

In 1956 Dr Henry left to work in Prince George and was replaced at VGH by Dr John D.E. Price. Meanwhile Dr Kolff, having immigrated to the US to work at the Cleveland Clinic in 1950, improved on his earlier device and developed the twin coil artificial kidney. Dr Palmer promptly arranged for Dr Price to spend a few weeks in Cleveland to learn about it. On Dr Price's return to the VGH, and at Dr Kolff's invitation, a trial of the twin coil was carried out and its superior functioning reported by Drs Palmer and Price in 1957.[7]

The treatment of acute renal failure by hemodialysis was now established, but up until 1960 a major problem was the need for repeated vascular puncture, which inevitably damaged vessels leading to lack of access; when that occurred the only alternative was peritoneal dialysis, or death. This problem of vascular access was the major reason why hemodialysis for chronic renal failure was not even considered.

Dr Gordon Murray, a surgeon in Toronto unaware of Kolff's work, built a machine with which he did a hemodialysis in December 1946. Although it was successful, his machine never came to anything for reasons given in an excellent 1999 article entitled, "Gordon Murray and the artificial kidney in Canada."[8] This extraordinary man was named a companion of the Order of Canada in 1967.

Dr Kolff was inducted into the Inventors' Hall of Fame in 1985, and in 1990 was named by *Life* magazine in its list of the 100 Most Important Americans of the 20th Century.

Peritoneal dialysis

Peritoneal dialysis also had problems with access. Repeated puncture of the peritoneal cavity carried the danger of leakage, infection, and the potential for visceral damage. Nevertheless Dr Palmer's interest in it began in the 1950s while still at VGH, in part because of these problems with hemodialysis but also to relieve pressure on this limited resource. Drs Palmer and Henry published their experiences in 1963 using repeated peritoneal puncture in eight acute and four chronic renal failure patients; six of the acute but none of the chronic patients survived, confirming the value of peritoneal dialysis in acute patients but giving little hope for those with chronic renal failure.[9]

Palmer's first life-saving hemodialysis using this equipment was carried out at Shaughnessy Hospital in Vancouver in September 1947.

In 1962 Dr Palmer left VGH to join St. Paul's Hospital, partly to pursue his interest in peritoneal dialysis, while Dr John Price continued to supervise dialysis at VGH. In 1964 the Vancouver General Hospital Renal Unit for Dialysis was opened and thereafter thrived and expanded under Dr Price's leadership. In those early days nephrology was not recognized as a specialty, and it was not until 1979 that the UBC Medical School created a formal Division of Nephrology under Dr John Dirks.

Back at St. Paul's Dr Palmer, with assistance from Dr C.E. (Ed) MacDonnell, another internist with an interest in the kidney, concentrated on peritoneal dialysis. Although it had been known that the peritoneal membrane had clinical potential as long ago as 1877, the first successful peritoneal dialysis for acute renal failure did not take place until 1923. Reports of successes thereafter were few until the 1950s.[10] A major reason for the

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Dr Russell Palmer, centre, after receiving a special recognition award in Seattle, February 1992. He is pictured with Mrs Palmer (far left), his daughters Noel Palmer (holding award), and Lynn Eyton (far right).

sluggish advance was the danger of repeated peritoneal puncture. Hence although both hemodialysis and peritoneal dialysis often saved lives in the short term, both had major problems with the need for repeated access. In the end both hemodialysis and peritoneal access problems were solved by the use of Teflon and silicone rubber.

In 1960 Professor Belding Scribner of the University of Washington in Seattle, a leader in long-term hemodialysis, had, together with his engineer Mr Wayne Quinton, devised Teflon catheters that were inserted in an artery and an adjacent vein for long-term vascular access. These catheters were joined by a flexible silicone rubber tube so that with anticoagulation blood could flow continuously between hemodialysis treatments, the tubes being uncoupled for the procedure. Hence repeated vascular puncture was avoided and the prospect of long-term hemodialysis for chronic renal failure became a possibility using this Scribner-Quinton shunt.[2,4]

Dr Palmer, alert to these advances, saw the potential of silicone rubber for use as a permanent peritoneal catheter, and described his idea to Mr Quinton, who fashioned the Palmer-Quinton silicone rubber peritoneal catheter. This, like the shunts for hemodialysis, remained in place for access when needed and peritoneal dialysis for chronic kidney failure also became a reality.[11]

Back at St. Paul's, Drs Palmer and McDonnell put the new Palmer-Quinton catheter to good use. There were no hemodialysis facilities then at St. Paul's, and since younger patients were given priority for the limited resource at VGH, the two doctors focused their attention on patients over 50 years of age with chronic kidney failure. In 1968 they reported their experiences with peritoneal dialysis using the Palmer-Quinton catheter in 21 patients, including a nurse aged 53, who survived for just under 2 years, did much of her peritoneal dialysis at home, and returned to work part-time. In effect she became the first recorded patient with chronic renal failure to do home peritoneal dialysis.[12]

However neither the shunt nor the catheter were without problems. The Scribner-Quinton shunts had the propensity to clot, requiring declotting by a physician or revascularization by a surgeon.

The Palmer-Quinton peritoneal catheter was prone to leaks, and infection could enter the track of the catheter through the abdominal wall and cause peritonitis. However, both devices paved the way for later improvements that are now in widespread use. The Scribner-Quinton shunt was superseded by the Cimino-Brescia fistula[2,4] and the Palmer-Quinton catheter by the Tenckhoff catheter, whose Dacron cuffs fibrosed in the abdominal wall, reducing the chance of infection.[4] There was now the distinct possibility of using both hemodialysis and peritoneal dialysis for long-term treatment of patients with chronic renal failure.

New Renal Unit at St. Paul's

In 1968 Dr Palmer was instrumental in recruiting his successor, the author, from the trial home hemodialysis unit funded by the State of Washington in Spokane, a unit funded only for home hemodialysis.[13] Thus 4 years after the opening of the Renal Unit for Dialysis at VGH, a second such unit opened at St. Paul's, each now equipped for hemodialysis and peritoneal dialysis; Dr Palmer was the driving force in the inauguration of both.

That was the end of Dr Palmer's active involvement in dialysis but he remained interested and in 1982 produced his acclaimed history of peritoneal dialysis.[10] In 1992 he received an award at the 12th Annual Conference on Peritoneal Dialysis in Seattle, where he made a brief presentation, "Afterthoughts"—essentially his swansong.[14]

What did Palmer achieve?

Dr Russell Palmer introduced both hemodialysis and peritoneal dialysis to British Columbia and by initiating the two renal units in Vancouver introduced, if unwittingly, an essential element of competition that triggered the rapid expansion that has resulted in BC's leading position in this field.

The first patients to do home hemodialysis were trained at St. Paul's in 1969[15] and at VGH soon after. Home

peritoneal dialysis was continued at St. Paul's[16] and VGH was the first to adopt continuous ambulatory peritoneal dialysis a major advance first described in 1978.[17]

Several other cities in BC now have dialysis units and train patients to treat themselves at home; some units were initiated and supported by Dr John Price in the 1960s and others later by St. Paul's.

Several hundred patients in BC are now dialyzing themselves independently at home; about 20% are doing hemodialysis and the others peritoneal.[18] Hundreds more are dialyzing in community centres with minimal assistance from nurses. Well over 1000 are receiving dialysis in hospital centres and some in nursing homes because they are elderly, infirm, or incapable of learning the procedure.

The first renal transplant was done at VGH in 1968, and when a second team was warranted, St. Paul's following in 1986. The advent of this second team resulted in a surge in numbers and the transplant rate was tripled in a few months. The total now transplanted approaches 4000. The paired exchange program was started in BC in 2009 and is increasing the pool of eligible donors. The zenith of this program to date is an exchange of kidneys among four couples.[19]

Is it too much to suggest that this explosion of activity resulted from a chance meeting in the Netherlands 65 years ago? I don't think so. History is full of individuals who, marching to the beat of their own drum, achieve more than an army of conscripts to another's.

Dr Russell Palmer was better known in the US than at home. In 1975 he was elected to mastership of the American College of Physicians, an honor granted only to "highly distinguished physicians…who have achieved recognition in medicine by…making significant contributions to medical science or the art of medicine…" Dr Palmer qualified on both counts.

Dr Palmer was a modest man not given to blowing his own trumpet. Like most of those who together have built our enviable renal failure program, he was a member of clinical faculty. Together with others in the 1940s and 1950s, and often opposed by the academic and political establishment,[20,21] he saw and seized on possibilities that in the aggregate have resulted in the well-being of millions worldwide whose lives have been saved and improved beyond measure by dialysis while they await the ultimate goal of a functioning kidney transplant.

In the last paragraph of his swansong, "Afterthoughts," Dr Palmer reminds us that however necessary and indeed seductive discovery can be, it is of no value in the context of our profession unless it serves our main purpose to care for the sick and injured.[14]

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