

The Peter MacCallum Radiology Collection

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Victoria's first specialised cancer hospital, the Peter MacCallum Clinic, officially opened in 1950 in one room at Melbourne's Queen Victoria Hospital. In his opening speech, Professor Peter MacCallum explained that the main impetus for the hospital occurred in 1936, when the State Government set up the Anti-Cancer Council of Victoria (ACCV).¹ In 1943, following years of lobbying by the ACCV, the Department of Health formed a committee for a proposed cancer institute, chaired by MacCallum. The committee finalised its report in October 1948 and by November a Bill for the new institute was brought before the Parliament.² This was passed into law in 1949, paving the way for the establishment of Victoria's first dedicated cancer hospital.

During this time MacCallum (1885–1974) was professor of pathology (and later dean of medicine) at the University of Melbourne, and an executive committee member of the ACCV. He was one of the main instigators of the hospital, which opened on the corner of William and Little Lonsdale Streets, at which time its outpatient clinic was named in his honour.³ While the hospital's name has changed over the years from the Peter MacCallum Clinic to Cancer Institute and Cancer Centre, today it



is simply known as the Peter Mac. In June 2016 it moved from the former St Andrew's Hospital site in East Melbourne (home to Peter Mac since 1994) to Parkville's new Victorian Comprehensive Cancer Centre (VCCC). A copy of the original *Cancer Bill* is currently on display at the VCCC, alongside a selection of items from the Peter MacCallum Radiology Collection (see p. 20).

Until June this year, the collection was largely hidden from public view. Displayed in a large cabinet in a corridor were early X-ray tubes, linear accelerator parts, and patient

devices produced in the hospital's mould room. Plans to catalogue this collection emerged in November 2015 when Dr Jacqueline Healy, senior curator of the Medical History Museum and Henry Forman Atkinson Dental Museum at the University of Melbourne, and I visited Peter Mac's East Melbourne site to inquire about borrowing items for a forthcoming exhibition.

The collection consisted of more than 100 items, dating back to the early 20th century. Apart from a few labels from a previous exhibition, there was no information or record of its contents. The Medical History Museum offered to help catalogue the collection before Peter Mac moved to its new home at the VCCC, and I was given the task through the university's Cultural Collections Projects Program. I began with little knowledge of cancer treatment, yet staff in Peter Mac's Physical Science Department welcomed me warmly. Many were unfamiliar with the items in the cabinet but were excited to see their collection receiving the attention and care it deserved.

Soon after I began cataloguing, it became apparent that this collection had grown continuously over the years. Items were overflowing from the shelves to the top of the cabinet and surrounding benches. Despite this,

Opposite: Magnetron, type M5015, made by the English Electric Valve Company (England), 1950s, metal, lead and glass; 23.0 × 20.0 × 33.0 cm. R1, Peter MacCallum Radiology Collection, Medical History Museum, University of Melbourne. Photograph by Alys Carr.

Below: Dosimeter, Victoreen Condenser r-Meter, 1928, stainless steel, lead, rubber, leather, velvet, paper; 39.0 × 14.0 × 5.0 cm. R68, Peter MacCallum Radiology Collection, Medical History Museum, University of Melbourne. Photograph by Alys Carr.

most items were in excellent condition, as they had been stored in their original cases; some were still wrapped in cotton wool.

From all accounts, items had been stored in the corridor of the Physical Science Department since 1994, when the Peter Mac relocated from the city to East Melbourne. There is some uncertainty as to who started the collection, but it is thought that many of the earlier items came from the Royal Melbourne Hospital when it relocated from Lonsdale Street to Parkville in 1944 and left most of its radiotherapy department in the Little Lonsdale Street building, which later housed the first Peter MacCallum Clinic.⁴

As well as the early Royal Melbourne Hospital equipment, there are items donated by the Launceston General Hospital and by the Commonwealth X-ray and Radium Laboratory, established at the University of Melbourne in 1928 to store and distribute the nation's radium for cancer treatment.⁵ This laboratory was run by Thomas H. Laby, professor in natural philosophy (physics), who was also an advocate for a specialist cancer hospital.⁶

One of the items donated by the Commonwealth X-ray and Radium Laboratory is a Coolidge X-ray tube.



Right: Mould of face of patient with tumour on nose, made in the mould room of the Peter MacCallum Cancer Institute (Melbourne), 1960s, plaster and paint, 9.0 × 14.0 × 13.0 cm. R87, Peter MacCallum Radiology Collection, Medical History Museum, University of Melbourne. Photograph by Alys Carr.

Below: Patient mask, made in the mould room of the Peter MacCallum Cancer Institute (Melbourne), 1960s, acrylic and metal, 29.0 × 28.0 × 33.0 cm. R90, Peter MacCallum Radiology Collection, Medical History Museum, University of Melbourne. Photograph by Alys Carr.



Designed by William Coolidge and produced from 1913 to 1918, this is considered one of the most important developments in radiology.⁷ Unlike gas X-ray tubes, which relied on gas to generate energy, the Coolidge tube generated electrons from a heated cathode,⁸ which advanced the beam's focus and allowed for more accurate control of the radiation generated, resulting in a more efficient and reliable form of X-ray tube.⁹ The example in this collection would have originally been used at the Commonwealth X-ray and Radium Laboratory to test X-ray methods and dosages for cancer treatment.¹⁰

Another important development was the ability to measure the amount of radiation generated, by using dosimeters. While X-ray and radiation therapies significantly advanced the possibilities of cancer treatment, they posed risks to radiologists through possible overexposure to radiation. One of the earliest dosimeters in the collection is the 1928 Victoreen Condenser r-Meter, still in its original green-velvet-lined case with instruction manual (see p. 17). A handwritten note inside the case shows that the meter was calibrated in 1945 by the Commonwealth X-ray and Radium Laboratory at the university. The Victoreen r-Meter was a huge commercial success, as it gave an

Thyratron valve, model RG4/3000, Philips (the Netherlands), 1950s, metal and glass, 30.0 × 7.0 cm (diameter). R5, Peter MacCallum Radiology Collection, Medical History Museum, University of Melbourne. Photograph by Alys Carr.

accurate reading of gamma radiation and X-ray dosage and was compact, portable and battery operated. It was the first meter of its kind, as it allowed the ionisation chamber to be disconnected from the reader, so the treating physician could accurately measure the intensity and dosage of X-rays from a relatively safe distance.¹¹

One of the Peter Mac's most specialised and busiest departments in the 1950s and 1960s was its mould room. Established in 1954 to manufacture radium and radon wax moulds, it quickly expanded to produce a vast array of equipment.¹² In an early report, Peter Mac's first medical director, Dr Rutherford Kaye Scott, described the mould room as 'a most important unit of the institute. Much of the efficacy of "beam direction" devices will depend on appliances made in it and other radium prosthesis requiring a high degree of technician workmanship will be manufactured'.¹³ The collection contains a number of items produced in the mould room, from a series of wedges to direct beam radiation, to wax and plastic patient moulds.

For cancers affecting a patient's face or neck, plaster impressions were routinely created in the mould room throughout the 1960s and 1970s. The collection has a series of these moulds, including one showing a cancerous

growth on a patient's nose (opposite, above). This mould was produced to accurately calculate and plan the direction of radiation required to treat the tumour. Moulds like these were phased out in the 1980s and 1990s when linear accelerators became more versatile and better equipped for treating facial tumours.

Along with plaster moulds, the collection also contains acrylic masks, which were used to accurately position a patient during treatment and help protect their healthy tissues from the damaging radiation beams. The example pictured opposite has lines drawn across it to indicate the area exposed to radiation.

One of the most significant developments in cancer treatment was the introduction of linear accelerators, commonly referred to as 'linacs'. The collection has several linac parts and accessories, including the original magnetron and thyratron valves from the Peter Mac's first linac, purchased in 1956 for £65,000, approximately 10 times the price of a deep-therapy X-ray machine. It was one of the first in Australia, and revolutionised cancer treatment. Compared to deep-therapy X-ray machines, which had a maximum of 300,000 volts, the M1 linac could produce a powerful and deep-penetrating beam of 4 million volts.





Display at the Victorian Comprehensive Cancer Centre, featuring items from the Peter MacCallum Radiology Collection, Medical History Museum, University of Melbourne.
Photograph by Lili Belle Birchall.

Thanks to the careful mechanical work of Peter Mac engineers, the M1 was still operating 20 years after its first use, one of only two of its kind worldwide.¹⁴

The magnetron (see p. 16) was a source of power for the original M1 linac, and the thyatron valve (see p. 19) was the gas-filled tube used as a high-power electrical switch and controlled rectifier.

In his speech at the opening of the institute's first linear accelerator suite in 1956, Professor MacCallum said:

This machine by reason of its power and its cost has a certain glamour. But the important point is that it will increase the capacity of the institute to treat patients; it will decrease the dangers of surface damage; it will increase the range of experience and the value of this place as a training centre; and it will add an instrument of precision for research.¹⁵

The collection's M1 magnetrons and thyatron valve are currently on display on the lower ground level of the Radiography Department at the VCCC. This display (pictured above) introduces visitors to the collection and highlights some of the most significant instruments

used for treating cancer at the Peter Mac during the 20th century. The opportunity to curate this display arose from the relationship that has formed between the university's Medical History Museum and the Peter Mac. After we catalogued and documented the collection, the Peter Mac generously decided to donate it to the Medical History Museum.

While researching the collection, the Medical History Museum received an engagement grant from the university to produce an online exhibition. As part of this project, I will conduct podcast interviews with senior and retired Peter Mac employees, to further explore the history and significance of this collection. The Medical History Museum will also include material from the collection in its 2017 exhibition *The cancer puzzle: Patterns, paradoxes and personalities*.

Lili Belle Birchall is in her final year of a Master of Arts and Cultural Management degree at the University of Melbourne, where she completed her honours degree in art history. She is currently completing an internship at the Medical History Museum through the Cultural Collections Projects Program.

The Medical History Museum is located on Level 2 of the Brownless Biomedical Library, University of Melbourne, see <http://medicalhistorymuseum.mdhs.unimelb.edu.au/>.

- 1 Peter MacCallum, draft speech for the opening of the Cancer Clinic. Unit 3, folder 24e, 1975.0042, Peter MacCallum Collection, University of Melbourne Archives.
- 2 T.F. Sandeman (ed.), *The Peter Mac: A personal reminiscence*, Melbourne: Docuscope, 2008, p. 24.
- 3 Sandeman, *The Peter Mac*, p. 14.
- 4 Sandeman, *The Peter Mac*, p. 21.
- 5 J.F. Richardson, *The Australian Radiation Laboratory: A concise history 1929–1979*, Canberra: Australian Government Publishing Service, 1981, p. 53.
- 6 Richardson, *The Australian Radiation Laboratory*, p. 4; Sandeman, *The Peter Mac*, p. 12.
- 7 Paul Frame, 'Coolidge X-ray tubes', Oak Ridge Associated Universities, <https://www.ornl.gov/PTP/collection/xraytubescoolidge/coolidgeinformation.htm>, viewed 5 August 2016.
- 8 Richard Francis Mould, *A century of X-rays and radioactivity in medicine: With emphasis on photographic records of the early years*, Philadelphia: Institute of Physics, 1993, p. 51.
- 9 Mould, *A century of X-rays*, pp. 51–2.
- 10 Richardson, *The Australian Radiation Laboratory*, pp. 5–6.
- 11 'Dosimeter: Victoreen Condenser r-Meter, 1928', Dittrick Medical History Center, Case Western Reserve University, <http://arts.case.edu/dittrick/online-exhibits/explore-the-artifacts/dosimeter-victoreen-condenser-r-meter-1928>, viewed 7 August 2016.
- 12 Sandeman, *The Peter Mac*, p. 78.
- 13 Dr Rutherford Kaye Scott, 'Training for staff of Cancer Institute', 1949. Acc. 68/3, box 7, folder 5/2, 1979.0003, Roy Douglas Wright Collection, University of Melbourne Archives.
- 14 Sandeman, *The Peter Mac*, pp. 41, 58, 59.
- 15 Peter MacCallum, speech at the opening of the linear accelerator suite. Unit 3, folder 24e, 1975.0042, Peter MacCallum Collection, University of Melbourne Archives.