A HISTORY OF EXAMINATIONS, CONTINUING EDUCATION AND SPECIALIST AFFILIATIONS OF THE ROYAL AUSTRALASIAN COLLEGE OF PHYSICIANS

Edited by Josephine C. Wiseman

his gray spirit yearning in desire
To follow knowledge like a sinking star
yond the utmost bound of human thought.

from "Ulysses"

Alfred, Lord Tennyson

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The History of the Australian and New Zealand Association of Physicians in Nuclear Medicine

Frank L. Broderick

A ray of light an instant seen.
Wordsworth

The Golden Jubilee of the College has provided the motivation for writing this history. The timing was fortunate in that most of the events are still within the memory of our ageing cerebral cortices. The response of the reader is predictable — a quick scan to find a personal mention, a second scan to count how many details are wrong and then consignment to a resting place to await more detailed examination, perhaps on our centenary celebration.

It may be, however, that the reader with the most sustained interest will be one far removed in time, who sees in it a small facet of late 20th century activity, an activity which, although altered almost beyond recognition, exists in his day, its lineage unbroken since George de Hevesy introduced the radio-active tracer technique.

The results have been rather more rewarding than might have been expected from one of de Hevesy's earlier experiments. He was, in 1911, an impoverished Hungarian, living in a Manchester boarding house presided over by a frugal landlady. Indeed, de Hevesy suspected she was prone to recycling his uneaten portions under a different guise at later meals. In order to test this theory he sprinkled the remains of his lunch with radio-active lead, Pb^{201}. He then over the next few days tested his newly-delivered hot dinners under a radiation detector. The result was confirmation of his theory, confrontation with his landlady and a long rain-soaked search for a more scientifically minded hostelry.

This brief communication is not a comprehensive history of nuclear medicine in Australia nor of the Society of Nuclear Medicine, although it does touch on both. I was determined that it would not be an eyeglazing recital of membership of various committees. In that regard it should be remembered that we are a small and democratic association and that most of the members have filled executive positions at some time. I remind them that mention in this narrative is more a question of age than of present fame. I assume also that my readers, apart from loyal family and association members, may include some who have had only passing contact with nuclear medicine, hence the technical explanations.

Like Gaul, the history of nuclear medicine is divided into three parts — pre-scanning, predominantly scanning and a return to diversity. These phases were determined by three factors — patient needs (often fuelled by an advance in another clinical discipline), the availability of new nuclear medicine techniques and the development of competing technologies.

A little background of world events as they relate to nuclear medicine may be appropriate. It concerns both radio-isotope usage and instrumentation. For consistency and because it is easier historically I will refer to radio-isotopes rather than the more correct radionuclides.

RADIO-ISOTOPE PRODUCTION

In 1931 E.O. Lawrence of the University of California at Berkeley invented the cyclotron; research derived from it produced a string of Nobel prizes in physics. An important by-product was its capacity to produce radio-active isotopes. For a decade he and his colleagues were the only source of these isotopes and their efforts made possible the development of radioactive tracer techniques. After World War 2, atomic reactors were able to produce neutron excess isotopes more easily and cheaply and they became the primary source of medically useful radio-isotopes such as iodine 131.

A third method of isotope production exists — the generator. This is a secondary device in which a parent long-lived isotope, produced either in a reactor or a cyclotron, decays to a medically more desirable daughter isotope of shorter half life. The daughter product is then removed daily or twice daily by flushing with sterile saline —colloquially called "milking the cow".

The Molybdenum ^{99} — technetium ^{99m} system makes Tc^{99m} available to nuclear medicine units remote from a reactor or cyclotron. It has become the most widely used generator, being developed shortly after the first use of Tc^{99m}, by Harper in 1964. It had waited 26 years for medical use after its first production by Segre and Seaborg in the Berkeley cyclotron.

Over the next few years Tc^{99m} was established as the dominant scanning isotope. Its radiation properties, half life of 6 hours, pure gamma emission pattern of decay and easy detectability of its gamma ray by scintillation detectors made it a near ideal agent. In addition its chemistry allowed it to be incorporated into many chemical compounds selectively taken up by different organs. The reduction of its valency by the use of tin enhanced its chemical reactivity.

EARLY INSTRUMENTATION

Most instruments for the localisation and measurement of radioactivity use sodium iodide crystals as detectors. That certain crystals scintillate when hit by a gamma or an X-ray was known to Rutherford in 1915 but its application in practical radiation detection had to await the development of the photomultiplier tube. Manual organ scanning was extremely slow and laborious and in 1951 Benedict Cassen, of the University of California, invented the rectilinear scanner, essentially a motor driven scintillation detector. A few years later David Kuhl, doing an elective term as a 4th year medical student, added the photorecorder. This was financed by a $300 donation solicited from a wealthy patient. As Kuhl wryly said years later, he was haunted by the thought that when he died people would say of him, "He did his best work as a medical student". As events turned out he need not have worried.

In 1958 Hal Anger (also of the University of California, Berkeley) described his new, large stationary scanning device, the scintillation or gamma camera. Development of this camera has produced the instruments which are still the "workhorses" of most nuclear medicine departments.

EARLY AUSTRALIAN EXPERIENCE

The first radio-isotopes used were phosphorus^{32} for the treatment of polycythaemia and I^{131} for the treatment and diagnosis of thyroid disease.

P^{32} was first used by J.H. Lawrence (a brother of E.O. Lawrence, inventor of the cyclotron) in 1936. The remarkable Arthur Cooper of Brisbane was able to obtain P^{32} from E.O. Lawrence in 1944 and to treat nineteen patients. This P^{32} was in fact produced by the Oak Ridge reactor but, because of the secrecy of the Manhattan Project, it was shipped to Berkeley and distributed from there, as being cyclotron produced. The intermediary was a mutual US Army friend stationed in Brisbane, Major Paul McDaniel who in civilian life was a physics professor at the University of Alabama.

These unofficial shipments stopped at the end of the war and it was not until 1947 that President Truman announced that the Oak Ridge Laboratories of the US Atomic Energy Commission would supply isotopes to foreign countries. The first shipment, 20 millicuries of P^{32}, went to CXRL (Commonwealth X-ray and Radium Laboratory) headquarters in Melbourne where it was divided into three therapy doses, two for Launceston and one for Perth.

Hamilton and Soley had performed radio-iodine thyroid uptakes in 1938 using cyclotron-produced I^{130} and Hertz had used the same isotope to treat patients with Graves' disease in 1941. In mid 1946 reactor-produced I^{131} became readily available and it soon became the standard isotope for the study of thyroid disease and the treatment of hyperthyroidism and functioning thyroid metastases. Seidlin had used cyclotron-produced I^{131} for the first treatment of functioning metastases in 1943. By 1946 Reid and Keston had produced I^{125} which Berson and Yallow used to such effect in radioimmunoassay.

In 1947 Hal Oddie from CXRL and Kaye Scott initiated I^{131} uptakes at the Royal Melbourne Hospital and the following year the NSW Bureau of Physical Sciences seconded Bernard Scott, physicist, to support the thyroid investigation unit at Royal Prince Alfred Hospital. Tasmania, Queensland and South Australia soon followed. In the early 1950s there was a heavy preponderance of Melbourne and Launceston in both therapy and diagnostic I^{131} studies. It was not until 1952 that I^{131} therapy was given in NSW and South Australia.

Cost containment was the order of the day in 1947. When quoted $US234 for a 20 mCi dose of I^{131} ($34 for the I^{131} and $200 for the air freight) an alert staff member at CXRL changed the order to 40 mCi to be delivered by ship. Predictably in those days of leisurely boating, 56 days later it arrived in Melbourne decayed to only 0.3 mCi!

From 1949 the British Atomic Energy Commission began to ship isotopes from Harwell and the strength of the US dollar dictated a change in supplier.

In 1949 Frank Rundle was appointed as an Honorary Surgeon at Royal North Shore Hospital in Sydney. He had an extensive interest and experience in thyroid disease and soon was active in establishing a regular radioiodine therapy service and later a thyroid investigation unit. In the latter project he was fortunate in luring Hal Oddie from Melbourne and their co-operation spawned much research activity with many collaborators including John Indyk, Tony Selsdon, Doug Tracey, Ian Thomas and Ian Hales. After his appointment as foundation Dean at the University of New South Wales, Professor Rundle carried his thyroid interest to Prince of Wales and was instrumental in

the appointment of a young Scot, I.P.C. Murray as its first staff specialist in Thyroid Endocrinology in 1962. He later became the first President of our Association.

Throughout the late 1950s and early 1960s the number of individual patient doses and the variety of isotopes imported; Cr^{51}, Fe^{59}, Sr^{89}, and Co^{57}, steadily increased. This steady increase sharpened dramatically with the introduction of Tc^{99m} into clinical medicine in 1964. In 1966 over 200,000 brain scans were performed with this agent in the US alone. Meanwhile Australian hospitals were gradually acquiring nuclear medicine equipment. The first Australian automatic scanner was probably one imported by Royal North Shore Hospital, an NRD with a 1" crystal imported in 1959. Its range was somewhat limited, three inches in one direction and two inches in the other. Royal Prince Alfred Hospital acquired a positron scanner in 1960, which was used for scanning the brain with Arsenic^{74}. This was followed by the installation of a five inch gamma camera at Prince of Wales Hospital in 1963. Between then and 1968 most major capital city hospitals bought conventional three to five inch crystal rectilinear scanners such as those made by Picker and Nuclear Chicago.

Adelaide imported two gamma cameras in 1969 and others followed around the country (and in New Zealand) over the next few years, the Commonwealth Government making a special grant for this purpose.

Sydney Hospital (Colin Hambly) acquired the first Sydney gamma camera in 1970, a few weeks before Royal Prince Alfred. Despite this RPA did 5,000 rectilinear scans in 1967. Other Sydney and interstate hospitals had somewhat different patient requirements and added depth in special areas; the thyroid contributions of Royal North Shore Hospital (Ian Hales) and Prince of Wales Hospital (Provan Murray) and cardiology at Royal Perth Hospital (Michael Quinlan) spring to mind.

LUCAS HEIGHTS

On 18 April 1958, New Zealander Charles Watson Munro, the AAEC chief scientist, brought his third nuclear reactor on stream — HIFAR at Lucas Heights, south of Sydney. He had previously commissioned the British and Canadian Atomic Energy Commissions' reactors.

From that time I^{131} was supplied from Lucas Heights except for one curious twelve month period in which the Indian Atomic Energy Commission filled the Health Department contract. Public tenders were called annually and on this occasion, the AAEC's tender was not the lowest. Lucas Heights poured its I^{131} down the sink (or radiation-protected equivalent), the Indian Atomic Energy pocketed the profits and the requirement for public tender was quietly dropped.

In 1965 CXRL began importing Tc^{99m} generators on a sporadic basis — 8 in 1965-66 and 24 in 1966-67. It introduced daily availability to Melbourne Hospitals in 1967. Lucas Heights commenced production of Tc^{99m} in 1968 and with it began Phase Two, the predominantly scanning phase of Nuclear Medicine in Australia.

In 1968 Henry Wagner of Johns Hopkins and David Kuhl from the University of Pennsylvania visited Australia, an inspired suggestion of the AAEC. They gave a series of lectures in each state and visited many of the hospitals. Both were pioneers in nuclear medicine and as a team they were hard to beat, motivators, instructors, entertainers —all of these and more. Each hospital they visited profited from a stream of seemingly effortless information; answers to problems, pithy suissuf unsolved problemand great experience in a wide range of techniques. All this was done with good humourand an understated but dramatic flair. Many association members date their initial interest in nuclear medicine to that tour. Regrettably David Kuhl has not returned to Australia but Henry Wagner has been here on several occasions, his interest sharpened by the fact that he has now become a vigneron. Invitations to meetings in the Hunter, Barossa and Margaret river regions get priority on his lecture calendar.

FORMATION OF OUR ASSOCIATION

Within a few years a group of physicians had grown up in each capital city, whose time was predominantly occupied by radio-isotope studies. In NSW they grouped together as an Association of Physicians in Nuclear Medicine. By 1969 plans were underway for the formation of a multidisciplinary Society of Nuclear Medicine along the lines of the American SNM. In May of that year it was formed in Adelaide as the Australian and New Zealand Society of Nuclear Medicine. Some areas such as residency training programmes were specific to the physician members of the SNM. As a consequence several interstate specialists approached the NSW Association of Physicians in Nuclear Medicine to form an expanded Australian and New Zealand Association. This was done, against all omens on Friday 13 February 1970.

The membership was small and the executive committee lived in Sydney so our early meetings were held at city restaurants. These early meetings were boisterous and memorable, especially those held at the Hungry Horse restaurant in Paddington. The menu and the agenda would appear interchangeably. Sometimes one was unsure as to whether one was voting for duck a l'orange, a bottle of Grange Hermitage or a meeting with the AAEC.

RELATIONSHIP WITH THE RACP

While in Adelaide in May 1969, we had discussed the possible interrelationships of our proposed association. One option was an independent College of Nuclear Physicians but our small membership made it appear non-viable. Most of the original association members were physicians with a strong desire to keep the new specialty clinically orientated. This led them to favour affiliation with the RACP rather than the RACR. In 1970 a combined committee (chaired initially by Dr H.M. Rennie and and later by Dr J. Frew), with representatives of the RACP, RACR and RCPA and the Association, unanimously agreed that Nuclear Medicine be accepted as a sub-specialty of Internal Medicine. An RACP educational sub-committee was formed to produce a training programme parallel with those in the other medical specialties. Training after the first part of the RACP examination became the responsibility of a supervisor for each of the approved posts in nuclear medicine.

Australia thus became the first country to have an approved programme of physician training and accreditation in Nuclear Medicine. It was not until 1971 that the conjoint Boards of Internal Medicine, Radiology and Pathology in the United States set up their Board of Nuclear Medicine. In the United Kingdom it was not until 1974 that the Royal College of Physicians recommended the affiliation of Nuclear Medicine with Internal Medicine on the basis of a model similar to the Australian model. In 1976 Canada adopted a model closer to that of the United States. By 1971 ten Australian hospitals were accredited for training in Nuclear Medicine and by 1973 there were 36 specialist positions throughout the country and 12 trainee positions.

STATE PROGRESS IN THE EARLY 1970s

The decade of the 1970s brought expansion and problems. Departments of Nuclear Medicine sprang up in most major hospitals.

Adelaide had been the launching pad of the ANZSNM in 1969 and was the first city to acquire conventional gamma cameras. It was supervised in the first year or two by the ebullient Harry Lander, outrageous before decorum and deanships descended. He was aided and then succeeded by Peter Ronai, fresh from the Donner Laboratory. Ian Buttfield, honourably stooped from carrying a thyroid uptake system around the highlands of New Guinea, left to commence a Division of Nuclear Medicine within the Queensland Radium Institute. Ric Baker introduced Tc^{99m} PG, the first useful biliary scanning agent, while searching for amino acid uptake in tumours. An occasional helper, physicist, Boyce Worthly, had constructed the third whole body counter in the world to monitor civilian personnel for fallout from the Maralinga tests. It was made of steel from the German fleet scuttled at Scapa Flow in 1919.

The New Zealand part of the ANZSNM was discrete yet important overall. Manpower was always at a premium and yet the hospitals were extraordinarily lucky in the calibre of the people they attracted into nuclear medicine. Peter Hurley, one of the Johns Hopkins' team that first described gated heart scanning, and Brian White, staffed Auckland. Bevan Brownlee at Christchurch was early in the use of computer techniques with his Nuclear Enterprises gamma camera and PDP 8. David Stewart, returned from Prince of Wales (and a brief period in the first private nuclear medicine practice) to Dunedin where he became Professor of Medicine.

On his return from Johns Hopkins in 1968, Michael Quinlan developed a unit at the Royal Perth Hospital which soon became well-known for its cardiac and computer studies.

Melbourne had a dominant role in the medicial use of radio-isotopes in the prescanning period. This was largely brought about by the interest of 3 radiotherapists, Kaye Scott, Bill Holman and Jim Madigan, two physicists, Hal Oddie and Ken Clarke, and one technician, Jean Milne. They created advanced and enterprising units, firstly at the Royal Melbourne Hospital and then at the Peter MacCallum Clinic. Ken Clarke did not entirely neglect the frugal values of the canny Scottish pathologist after whom the clinic was named. He perfected a method of recovering radio-iodine from urine, so that about three days after his initial oral dose, the thyroid cancer patient would be presented

with a second drink, not exactly similar to the first but oddly familiar. Meanwhile Les Dugdale had set up a unit at the Alfred Hospital, which subsequently became part of the Monash University group.

In 1966 John Andrews returned from the Peter MacCallum Clinic to the Royal Melbourne Hospital to head its renamed Department of Nuclear Medicine. He recalls the first lung scan done at that unit. After giving a somewhat hesitant scan diagnosis of pulmonary embolism, he was horrified to see the patient immediately wheeled to the operating theatre for a Trendelenberg operation. The pulmonary artery fortunately surrendered a large clot and the patient and lung scanning in Victoria survived.

Tasmania was as usual divided into two armed camps. The northern tribes at Launceston gave hospitality to a branch of the Peter MacCallum Clinic and shared early in its very active isotope programme. Hobart opened its combined department of Nuclear Medicine and Endocrinology in 1968, with Roger Connolly as its first director. He did excellent work, particularly on the epidemic of hyperthyroidism that followed the iodination of Tasmanian bread, the Jod Basedow phenomenon.

OVERSEAS RELATIONSHIPS

Dating from the visit of Wagner and Kuhl, Australian nuclear medicine contacts have been largely with American experts and centres. Many strong personal bonds have been developed from periods of experience at Johns Hopkins (Wagner), the Donner Laboratory, the University of Pennsylvania (Kuhl), Chicago (Harper), Upstate New York (McAfee), the Harvard Group (Strauss and Adelstein), UC San Diego (Ashburn) and many other institutions.

For a long time we had little contact with European nuclear medicine. Our Association started at a time of great national prosperity; war and its aftermath did not impinge on our early workers in the way it did with some Europeans. Kurt Scheer, the first Professor of Nuclear Medicine in Europe and director of the German Cancer institute, had a great sense of timing. He acquired hepatitis B at Stalingrad, the jaundice becoming apparent just in time to put him on the last train out, leaving behind the almost completely encircled German Sixth Army group. A year or two later, as a hospital resident, he made one of his regular visits to the local U.S. army dump in search of a part for his bicycle. While turning over the largesse, he came across a partly-burnt publication on radio-isotopes of possible medical use. He read part there, the rest at home, and in the next six weeks most of what was then available to German libraries. The rest of his professional life focused on nuclear medicine. In the last year or two our eyes have turned more often towards Europe particularly due to the development of excellent PET-cyclotron units at Hammersmith, Uppsala, Paris, Julich and Heidelberg. It seems likely that much more interchange in nuclear medicine will occur with continental Europe and the United Kingdom. The recent amalgamation of the Society of Nuclear Medicine, Europe, and the European Society of Nuclear Medicine marks a significant rapprochement in European nuclear medicine.

DIFFICULTIES OF THE MID-1970s

In the mid-1970s our predominantly scanning phase began to run into problems, largely associated with the increasing popularity of CT and ultrasound. The first CT was

imported by the Royal Melbourne Hospital in 1975. Other units quickly followed. Its impact, in relation to nuclear medicine, was largely on brain scanning as the following figures from Royal Prince Alfred Hospital depict. Ultrasound competed predominantly in liver scanning and, with CT, reduced its numbers but less dramatically.

	RPAH Brain Scans	RPAH Liver Spleen Scans	RPAH Gated Heart Studies
1976	2891	2036	
1977	1896	2941	178
1978	1630	2129	466
1979	837	1901	660
1980	493	1695	843
1981	364	1962	985
1982	353	1750	1114
1983	252	1719	1405
1984	134	1393	1370
1985	74	1137	1260
1986	62	788	1426

The Royal Australasian College of Radiologists was keen that these new disciplines become part of radiology. The old traditional studies were renamed General Radiology with new divisions to accommodate ultrasound and CT. We had a special sympathy for the ultrasound specialists and their reluctance to be dispossessed. It seemed to us that any new technique that required electricity, except for neurophysiology, was likely to end up as a branch of radiology. What made matters worse was the fervour with which medical administrators embraced this concept. As brain and liver scan numbers fell, Health Commissioners in various states with the notable exception of David Storey felt that nuclear medicine would gradually die and prepared to give it a hasty and not too decent interment. Alas, it was not to be. New radiopharmaceuticals and computers galloped to the rescue. The third phase of nuclear medicine, diverse and largely functional, had arrived.

Gated (by the ECG) heart blood pool scanning had been introduced in 1971. It allowed separation of systole and diastole. Comparison could then be made of the outlines to detect focal or generalised hypokinesis or dyskinesis. The addition of a computer made ejection fraction measurement and multi-interval analysis possible. This technique has come to occupy a considerable portion of the time of most nuclear medicine departments. Similarly quantitative isotope renography has become important with serial studies being particularly useful after renal transplantation.

OUR PRESENT STATE

Development of nuclear medicine is, as it has always been, tied to the introduction of new radiopharmaceuticals and instrumentation and the ingenuity of man in their use.

Radiopharmaceutical production is proceeding along two lines, new technetium ^{99m} and iodine ^{123} based agents, and positron-labelled compounds. There still appears to be a great deal of life in technetium ^{99m}. Isonitriles labelled with Tc^{99m} are in the clinical trial stage and seem likely to result in much better myocardial perfusion studies than are possible with thallium ^{201}. Technetium ^{99m} HMPOA is retained in the brain in the

pattern of arterial distribution at the time of injection and will find considerable application in cerebrovascular disease. Cyclotron-produced I^{123} combines the great chemical reactivity of iodine with greatly improved radiation dosimetry. Both these radioisotopes may be used with conventional planar scanning or SPECT scanning.

PET, SPECT AND THE CYCLOTRON

Radiological tomography has been widely used since it was first introduced by Van der Plantes in 1926. Computer-assisted axial tomography is much more recent and was first described by David Kuhl in 1963. He and various contemporaries devised several nuclear medicine instruments in the following years but radiology produced the first major impact with the development, by Hounsfield, of X-ray computed tomography in 1973. It was not until the last few years that improvement in gamma camera gantrys, computer speed and software, allowed emission trans-axial computerised tomography to enter clinical nuclear medicine.

Emission computed tomography may be performed with one of two groups of radio-isotopes. The conventional gamma emitters such as technetium ^{99m}, thallium ^{201} and gallium ^{67} produce streams of single photons; so their tomographic detection is called single photon emission computed tomography or SPECT. Positron emitting radio-isotopes include fluorine ^{18} and of course carbon ^{11}, oxygen ^{15} and nitrogen ^{13} which are of great metabolic significance. These are very short-lived and cyclotron-produced, hence the need for a cyclotron and PET unit in close proximity.

In terms of instrumentation PET is also more demanding. It requires a ring of detectors as opposed to the single rotating gamma camera needed for SPECT, but in return gives more potential for quantification and better resolution. At present PET is largely a research tool. SPECT is already part of clinical nuclear medicine.

Australia is finally to get a cyclotron 26 years after Jim McRae's first submission to government. Its absence has retarded nuclear medicine research. With it will come the capacity to produce a full range of medically useful radio-isotopes, including those whose short half-life have made importation impossible.In particular, it produces the positron emitters necessary for PET, also I^{123} and gallium ^{67} will also become more readily available.

HORIZONS

There is great optimism in the Association about the new technology and its capacity to demonstrate normal and abnormal biochemical pathways. That is what PET provides — lessons in applied biochemistry.

So far most PET studies have concentrated on brain and myocardium. Fascinating but fragmentary insights into "degenerative" and other brain diseases have been obtained. The concentration of dopamine in the caudate nucleus appears low in Parkinsonism. A rather characteristic reduction of blood flow in the temporo-parietal region has been observed in Alzheimer's disease although a combined NIH — Lidcombe Hospital study suggests this may sometimes be due to cerebral atrophy. Reduced glucose metabolism has been demonstrated in the cortex and basal ganglia of schizophrenics. Epileptogenic foci between seizures have low glucose metabolism and

low blood flow. Some patients after head injuries have a persisting profound reduction in glucose metabolism in their frontal lobes despite almost complete absence of clinical abnormality.

I^{131} labelling of free fatty acids has given SPECT a role in metabolic studies of the heart muscle. This technique has been used to demonstrate reduced *metabolic* activity in part of an infarcted area.

Sometimes blood flow agents and metabolic tracers using SPECT and PET have been combined to dissect the mechanism of a clinical problem. Is the demonstrated metabolic abnormality due to reduced perfusion or does it exist in the presence of normal blood flow? Radiolabelled monoclonal antibodies will add specificity in investigation of cardiac and cancer patients and may have potential for specific therapy.

The impact on pharmacology and hence therapeutics may be immense. Professor Langstrum of Uppsala has estimated that he can radioactively label 80% of the current pharmacopoeia.

The multiple fragments of information thrown up by the new metabolic tracer techniques bode well for the next few decades. Australian participation in the best of these existing prospects is by no means a foregone conclusion. We will have to demonstrate ingenuity and application, and mobilise our resources. Local radiopharmaceutical production and perhaps the development of a local nuclear medicine instrumentation industry will be important ingredients if we are to share fully in that potential.

PRESIDENTS

1970 — 1972	Professor I.P.C. Murray
1972 — 1974	Dr M. Quinlan
1974 — 1976	Dr F.L. Broderick
1976 — 1978	Dr J. Morris
1978 — 1980	Dr L.B. Arkles
1980 — 1982	Dr J.A. Booth
1982 — 1984	Dr I.H. Buttfield
1984 — 1986	Dr F. Lovegrove
1986 — 1988	Dr A. McLaughlin

ANZ ASSOCIATION OF PHYSICIANS IN NUCLEAR MEDICINE

Associate Professor James McRae

Past Presidents, Dr Andrew McLaughlin & Dr John Morris

Past Presidents, Dr Frank Broderick & Assoc. Professor Provan Murray