

# ACPSEM NZ Branch Newsletter

December 2007



*Waihou River, nr Putaruru*

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The Newsletter of the Australasian College of Physical Scientists and Engineers in Medicine, New Zealand Branch is published 3 times a year and distributed electronically to NZ members of the College and other interested parties. Contributions for consideration of publication are welcomed from all members; for information please contact the Newsletter Editor.

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## *From the Chair*

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Compliments of the Season.

I hope that you all have had an opportunity to recharge the batteries for the coming year. The New Year ushers in a change to the ACPSEM

NZ Branch committee with John Turner replacing Mark Holmes as branch secretary and Lynne Greig joining the branch committee.

Preparations are well under way to organise the activities of the NZ branch for 2008.

This begins with the establishment of key goals for this year. I would like to encourage you all to support your branch committee and contribute to their work.

Nominations for a working party to establish the college's position on changes to the New Zealand Radiation Protection legislation are now open. It is envisaged that a number of working parties will represent the major disciplines: Radiation Oncology, Radiology and Nuclear Medicine. Please forward your nominations to your branch committee.

***Matthew Paris***

*Chair NZ Branch, Dunedin Hospital*

## *News from Wellington*

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Wellington Blood and Cancer Centre has emerged relatively unscathed from 2007. However, Capital and Coast District Health Board has been taking a beating in the media and the politicians have been having a crack at it too. At one time we acquired the moniker "Killer Hospital" from ACT's Heather Roy. That being said staff morale appears normal as we march into 2008.

We are still waiting for the final approval on a third linear accelerator, but we anticipate this arriving in mid 2008. A new linear accelerator will of course come with a host of new projects to keep us busy as well. We also plan to commission some new Monte Carlo-based treatment planning algorithms for photons and electrons, which pleases our local Monte Carlo proselytizer, Bryn Currie, greatly. Prostate brachytherapy is on the cards also as the new HDR service matures.

WBCC has been active on the training front as well. We hosted a round of the ACPSEM practical exams in August this year and an IMRT workshop in November. Congratulations are also due to Bryn on passing the September installment of the new TEAP written exams.

NZPEM 2007 held in the Wellington School of Medicine on the Wellington hospital campus is now history. Thanks to all who presented at the conference, we are also very grateful to Prof. Paul Callaghan who gave us what NRL's Tony Cotterill described as a Total Perspective Vortex experience (see Douglas Adams's Hitchhikers Guide to the Galaxy series). Note that you can watch Paul's lecture "Beyond the Farm and the Theme Park" online at <http://www.hotscience.co.nz/>. Still on the conference side of things EPSM 2007 in Perth was attended by Ekta Jhala and Bryn Currie. Perth was an incredibly long way to fly to attend the college meeting for New Zealanders but the experience was valuable with keynote speakers talking on the latest research in heavy ion and proton therapy modalities happening in Europe.

On the staffing side of things, we had a couple of changeovers mid-year. Louise and Alan Gately left us to return to the UK after a 2 year stay, and then Tom Wilson and Adele Stopforth arrived – also from the UK. Tom previously worked at UCLH, Oldchurch and Royal Free Hospitals in

London and Adele at Royal Liverpool and Clatterbridge. John Turner has come and gone after dropping in to give the current crop of registrars the benefit of his wealth of experience. We are also in the process of recruiting to a couple of vacancies and appointing a new registrar for 2008. Tom is settling in well. He has tackled the treatment planning mountain in our department and is managing admirably. He



has inspired a number of the junior members of the department in more than just medical physics as well – recently completing the Round the Lake Taupo ride and being up for numerous cycle rides, sea swims and half marathons. This compensates nicely for his incessant complaining about the quality of NZ chocolate.

*Looking good, Tom. Just go a little faster, eh!*

### *News from Dunedin*

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Our new Varian iX went clinical in October and we are now reaping the advantages of having 2 beam-matched machines.

Matthew Paris, Jonathan Griffin and Mark Holmes travelled to Perth in October to attend EPSM 2007 and then to Wellington in November to attend NZPEM 2007. Both conferences were organised exceedingly well with a high quality of papers and presentations, but I'll send a special thank you and congratulations to the organisers on our own patch of the Branch conference.

On the staff side, Andrea Zytovicz joined us in November. Andrea has approximately 3 years experience at the

University of San Francisco, California (UCSF) working mainly with IMRT QA and is fresh out of a Masters program at University of Minnesota in Medical Physics. Prior to that she worked at the Harvard Cyclotron Laboratory with proton radiotherapy (before it was closed down in 2002 to build a parking lot!). Andrea has recently had a paper published in PMB entitled *Peripheral Dose in Ocular Treatments with Cyberknife and Gamma Knife Radiosurgery compared to Proton Radiotherapy (52 2007 p5957)*

*Mark Holmes*

### *News from Christchurch*

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Great EPSM meeting in Wellington thanks Lynne and team. Wellington waterfront on a fine day is a splendid place.

We are looking forward to Jerome Gastaldo joining our Oncology Physics team in January. It has taken more than a year to replace Steve Morgan. Jerome is from

Grenoble and has just completed his PhD at the synchrotron there. As well he has Masters in Medical physics for imaging and radiation (University Paul Sabatier, Toulouse) and DQPRM (Medical physicist diploma) (Certified medical physicist authorized to perform treatment planning in hospital). Hopefully we can establish a link with the Melbourne synchrotron.

Registrar appointments are currently underway. Too many excellent applicants this year! Steven Marsh, our Nuclear Medicine registrar starts in the hospital in January.

St Georges (private) hospital are establishing a Cancer Centre and are engaging some DHB services to ensure a cooperative relationship between public and private. Hence Jenny is flitting across to Australia for the occasional LINAC site visit to check out machines (and associated technologies) while Richard T. is leading (from behind) radiation safety advice on bunker design. Actually Ben Wilder is doing all the preliminary work for this while we wait to find out what is eventually proposed.

PET/CT (or lack of it) is stirring up the locals. The national scene continues to look bleak for the public sector. Nevertheless

Christchurch has cranked up its working group again after a year's hibernation and Darin and Richard T are engaged with that.

Finally for something entirely different here is a Christmas story from our previous Nuclear Medicine Physics registrar:

### ***Life in a Black Hole***

Actually, the hole is pretty well lit, but for all the money that is being poured in to it, it may as well be a black hole. Nevertheless, life in a cavern 100m under the town of Cessy, France is treating me well.

I left NZ after an unintentionally short spell in the Medical Physics and Bio-Engineering department and headed to the Swiss-French border to work at CERN, the European Centre for Nuclear Research (CERN is an easier acronym to pronounce than ECNR!). Here, physicists bang protons together in exactly the same way primitive ape-men bashed rocks together to see what came out (the answer was 'smaller rocks'!)

Now, 10 million years later (or 6000 years if you believe in creationism), CERN are trying to find the last of the 'small rocks', the Higgs Boson – the particle that gives things the property of mass! I am not experienced enough to be involved in the



search for such an illusive particle directly. My job is to help ensure the 'rocks', i.e. beams of protons, hit each other and are not contaminated with other unwanted particles.

The work entails designing the mechanics, electronics and software for a project known as the Beam Scintillation Counter, a collection of plastic scintillator tiles connected to photomultiplier tubes and some electronics. A typical day involves running around the French countryside collecting bits of piping, cabling, electronic modules etc and putting them together to make something that works... very much like the Wombles of Wimbledon [1].

As yet, my French skills are almost non-existent and I am getting by on a few well known phrases ('Je ne comprends pas!', 'Veuillez parler lentement!' and 'Que diable voulez-vous dire?') But, if all goes to plan, I will start my PhD at Geneva University next year and will have to learn quantum

mechanics, gauge theory and particle physics in French. Well, I never said it was a good plan!

It is now nearing the end of 2007. It has been a great year for me. I hope it has been for you too. I will be thinking of you all enjoying the Christmas season under beautiful blue skies and the warm sun while I will be under half a meter of snow (and a 100m of France).

Merry Christmas and a Happy New Year.

[1] <http://www.toonhound.com/wombles.htm>

*Alan*

And work continues preparing for the College meeting in Christchurch next year:

*Richard Tremewan*

# epsm abec 2008

## Innovations in Patient Care

**16-20 November 2008**

Christchurch Convention Centre  
Christchurch, New Zealand



**Email:** [epsm-abec@uco.canterbury.ac.nz](mailto:epsm-abec@uco.canterbury.ac.nz) **Phone:** +64 3 364 2915 **Web:** <http://www.uco.canterbury.ac.nz/conference/epsm-abec>



Nikki Shelton from Austin Health in training for the ConTour de France using CMS Direct Access - the Yellow Jersey of radiotherapy planning systems



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## *The History of Medical Physics and Biomedical Engineering in New Zealand – Part 3*

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*The Development of Medical Physics and Biomedical Engineering in New Zealand Hospitals 1945-1995* was first published in 1995 and a second edition was produced in 1996. After the efforts of David Goode and Hugh Jamieson it is now available in electronic format.

With copyright permission from Hugh Jamieson we will publish regular extracts in this newsletter. There are some wonderful insights into both how much technology has changed and also how familiar many of the early political issues are in today's environment.

### **NUCLEAR MEDICINE :**

The post-WW2 era also ushered in vast new possibilities with the availability of artificial radionuclides, subject of course to their provision and practicable delivery to remote areas like NZ. However, for interest it could be noted that apart from the recognised uses of radium and radon from early days, there were earlier medical uses of radioactive materials! I was intrigued by obviously old small packs of "radioactive selenide", found during a cleanout at Dunedin Hospital pharmacy, which had been used around 1935 as a colloidal solution given intravenously in conjunction with X-ray therapy. The descriptive pamphlet said "...Results obtained are stated to be good, (and in italics) 'all things considered'...."

Then there was the NZ use of "radon ointment", provided (presumably with reluctance!) by NRL, as a preparation of radon in vaseline ("0.76 mCi/12.6 gm ointment"), to treat small skin areas with necrosis after radiotherapy. The idea was that alpha rays accelerated healing (refer "Treatment of radiation necrosis with radon ointment", C C Anderson (Invercargill), Australasian Radiology, vol 4, p 104, 1961.) This article was followed interestingly enough by "Clinical RBE of 24 MV X-rays cf 200 kVp", C W S Jerram (Dunedin), vol 4, p 106, 1961.

So, making a quantum leap into modern nuclear medicine, what do we find? Dr Jim Campbell, late Radiotherapist at Christchurch Hospital, prescribed the first doses of I-131 for medical use in NZ in 1948, the same year that artificial radionuclides first became available in the UK. In Christchurch, three shipments of I-131 were imported directly from Oak Ridge, and were dispensed by George Roth and Bert Yeabsley of NRL, as there was no physicist at Christchurch Hospital. The "official" view on this new field was that all 'nuclear medicine' work should be centred in Christchurch. Bob Borthwick was busy from his appointment there in June 1954, setting up a "hot" lab (basement/s of course!) and developing other nuclear medicine activities.

However, of course, other centres were soon involved. In Dunedin, the highly-regarded Medical School Thyroid Research Unit (Dr's Purves and Adams; note in passing that Purves and Hercus introduced iodised salt into the NZ diet to prevent goitre) was carrying out I-131 thyroid uptake tests by 1950, with equipment they designed themselves - I became involved in this, and by 1955 all these tests were carried out at Dunedin Hospital. The first Dunedin Hospital use of I-131 was on August 13 1950, using 400 uCi I-131 to test possible uptake in a large skull secondary (hemisphere 10 cm dia), with positive results. After thyroidectomy, the patient was then treated with 62 mCi I-131. A further secondary was found in the spine before any radiological evidence, which gave our radiologists food for thought. The patient did well but refused to attend further follow-ups! P-32 was first used in June 1954; other radionuclides came slowly into use.



I-131 thyroid uptake equipment, 1952, as developed by Thyroid Research Unit, Otago Medical School. Two G26.Pb geiger tubes; 25 mm lead-walled 'castle'; perspex neckbar; good geometry, with 20 inches (50 cm) distance from geiger tube to neckbar; Note binary '64 Scaler' with separate timer. 'Patient' seated in dental chair

All centres rapidly got into usage of radionuclides. The first recorded NZ use of intravenous P-32 for polycythaemia was in

July 1952 at Palmerston North (Don Urquhart again, with Athol Rafter from Nuclear Sciences, DSIR). The use of I-131 followed in that year (1952). In Auckland, the Dept of Endocrinology under Prof Kaye Ibbertson was using radionuclides for diagnosis and treatment from 1954. In Wellington, Eugene Lynch (radio-therapist) started up thyroid tests in January 1952. The use of P-32 for polycythaemia began there on April 28 1953 under Verney Cable (physician). There is a semi-whimsical comment added about this in Allan McArthur's paper "The Evolution of Nuclear Medicine in NZ", 1989, which is still thought-provoking from a protection aspect: "...Many prominent personalities gathered in a lean-to room adjacent to the old Radiotherapy Dept to witness this procedure. Besides Verney Cable there were George Roth, Athol Rafter, Bill McCabe, Eugene Lynch and John Logan. On this day George Roth discovered a small amount of unsealed radium overlooked during the shift of the radon plant to Christchurch. The source was sealed and quietly transported to Christchurch for safe disposal. 36 years later there is still detectable activity in this area, but as it is not occupied, there is no staff hazard...."

#### **NUCLEAR MEDICINE IMAGING:**

(Some detail below comes from Allan McArthur's paper on NZ nuclear medicine developments. His paper makes interesting reading on other aspects). Imaging was a natural extension of the use of radionuclides in medicine. In Auckland, "thyroid scanning" began with a hand-held counter with a pinhole collimator over the patient's neck, after I-131 administration, with the physicist reciting and recording the ratemeter counts. An IDL dual probe colour scanner came into use in 1965, with Bruce White in the action. In Christchurch, Jack Tait, Tom Rogers, and George Gates designed and built a rectilinear scanner for whole-body imaging 1963-66. Dunedin purchased the first commercial scanner, a Picker Cliniscanner (crystal 50 mm dia x 25 mm), with vibrating stylus and teledeltos paper (grey-scale image), and had it in use in January 1962. As clinical interest grew, Fergus Thomson and Colin Medcalf designed and built a colour-scanning head, and had it in use by Feb 1966. Different models of Picker Magnascanners appeared soon after in most centres - Palmerston North 1965; Wellington ?1965; Hamilton 1966; Auckland 1968; Dunedin (Invercargill unit on loan) 1968; then Radiax scanner 1970; Invercargill (unit retrieved from Dunedin) 1972; Napier ??

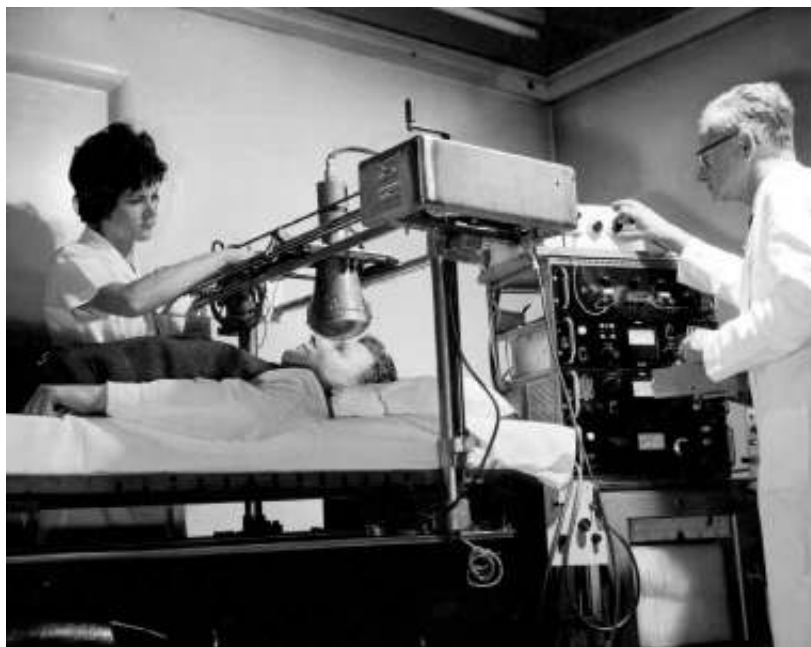
Gamma cameras were now under active development - I saw British prototypes in 1963, but Anger was well ahead in the USA. There was a period around 1965 when rapid developments in gamma cameras raised the question of whether to buy now, or wait for the next advance. But with the advent of Tc-99m generators, first in use in Auckland in 1967, the scene was set for a very rapid transformation into modern imaging with gamma cameras in most centres by 1969-72. The new field of production of radiopharmaceuticals locally had also arrived and had to be solved, usually with the addition of a radiopharmacist. The overall expansion led to setting-up of

Nuclear Medicine Depts in several centres, with hospital physicists closely involved, except in Palmerston North. To some extent, hospital physicists had initiated the developments, often with considerable scientific and technical achievements in equipment, and then saw the fruits of their labours seized gratefully by interested clinicians! As we all know, there has been no pattern, with ongoing fragmentation, sometimes with Radiology, Haematology, or Laboratory Services claiming relevant areas.

Hugh Jamieson,  
November 1995

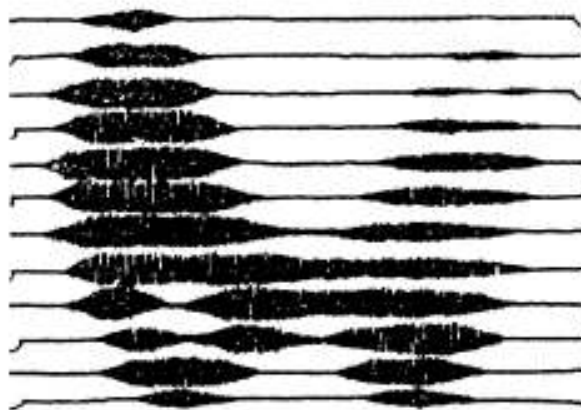
**THE CHRISTCHURCH HOSPITAL RADIOISOTOPE SCANNER PROJECT,  
1963-66:**

On Jack Tait's return to NZ (from Berkeley, California), a big effort was put into developing and building a radioisotope scanner capable of whole body imaging. An old diagnostic X-ray couch was obtained from the private radiology clinic, and formed the base of the scanner. George Gates built all the scanning mechanism in the Physics workshop. It was first used clinically in 1964; after several modifications and improvements it was finally completed in 1966. This machine



Early rectilinear scanner, designed and built by Medical Physics staff, Christchurch Hospital, with Jack Tait at the controls, and Tom Rogers as a simulated patient

used cake-mixer drive motors as these were the only variable-speed motors readily available at that time. Nuclear Medicine legend has it that the best speed setting for bone scanning was '#5 - Mashed Potatoes'!



Typical thyroid scan, using phantom, taken on the Christchurch Hospital original rectilinear scanner

Printout of the images was originally via an oscilloscope screen and photographic camera, but this was soon replaced by a mechanical dot printer, and finally by an amplitude modulated pen scan on an X-Y plotter. At first a 1-inch diameter NaI crystal detector was used. This was replaced in 1966 by a 3-inch detector. Tom designed, and George built, a fine multihole focussing collimator for this new detector. The scanner functioned very satisfactorily for 10 years before being replaced by a Nuclear Data Gamma Camera in 1974.

Jack Tait,  
October 1995

*Note: The article above has been extracted from the first and eighth chapters of 'The Development of Medical Physics and Biomedical Engineering in NZ Hospitals 1945-1995'. This book, which was edited by Hugh Jamieson in 1995, is available in pdf format on a CD from David Goode ([david.goode@slingshot.co.nz](mailto:david.goode@slingshot.co.nz)). It is intended that it will also be accessible from the ACPSEM NZ Branch website in the not too distant future.*

*David Goode*