ACPSEM NZ Branch Newsletter

April 2007

Getting ready to break a leg, Whakapapa skifield

Photo : Fiona Bignell

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The Newsletter of the Australasian College of Physical Scientists and Engineers in Medicine, New Zealand Branch is published 3 times per 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.

The 2007 ACPSEM New Zealand Branch Committee members are:

Chairperson . . . . . **Matthew Paris** *Oncology & Haematology CPG, Dunedin Hospital, 201 Gt King Street, Dunedin. Tel: (03) 474 7947 x8375 email: Mparis@healthotago.co.nz*

Vice Chairperson . . . . . *(Vacant)*

Secretary . . . . . **Mark Holmes** *Oncology & Haematology CPG, Dunedin Hospital, 201 Gt King Street, Dunedin. Tel: (03) 474 7007 x5135 email: mark.holmes@healthotago.co.nz*

Treasurer . . . . . **Mark Dirksen** *NRL, PO Box 100166, NSMC, North Shore City, Auckland. Tel: 09 441 3687 email: mark_dirksen@nrl.moh.govt.nz*

Committee . . . . . **Keith Croft** *Palmerston North Oncology, Ruahine St, Palmerston North Hospital. Tel : (06) 356 9169 x8147 email: keithc@midcentral.co.nz*

Brian Lunt *Cardiac Physiology, Auckland Hospital, Private Bag 92024, Auckland 1. Tel: (09) 307 4949 x5380 email: brianl@adhb.govt.nz*

Isla Nixon *Oncology Centre, Auckland Hospital, Private Bag 92024, Auckland 1. Tel: (09) 307 4949 x6205 email: islan@adhb.govt.nz*

John Turner *Medical Physics and Bio-Engineering, Christchurch Hospital, Christchurch. Tel: (03) 3640853 email: John.R.Turner@cdhb.govt.nz*

Giles Wynn-Williams *Medical Physics Dept, Dunedin Hospital, 201 Gt King Street, Dunedin. Tel: (03) 474 0999 email: giles.wynn-williams@stonebow.otago.ac.nz*

Newsletter Editor . . . . . **Mark Holmes** *Oncology & Haematology CPG, Dunedin Hospital, 201 Gt King Street, Dunedin. Tel: (03) 474 7007 x5135 email: mark.holmes@healthotago.co.nz*

Towards Glenorchy

From the Chair

NZ Branch Incorporation

Thanks to the efforts of Brian Lunt the ACPSEM (NZ Branch) is in the final stages of becoming an incorporated society. Members will then be advised to participate in an email vote on the new Branch rules. Following incorporation by the registrar of societies, transfer of assets will be completed.

HPCA Act 2003

At the last AGM, George Coalter raised the importance of members having a good understanding of the Health Competency Assurance (HPCA) Act 2003. Our profession is not registered under this Act, whose principal purpose is "to protect the health and safety of members of the public by providing for mechanisms to ensure that health practitioners are competent and fit to practise their profession." A sub-group of your branch committee will examine the implications of the HCPA Act on our profession.

Radiation Oncology

A Tripartite Committee comprising representatives from the Faculty of Radiation Oncology, the Australian Institute of Radiography and the ACPSEM are developing standards for radiation treatment services. The draft standard has been circulated to RO Principal Physicists and is now open for feedback; submissions close **Friday 16th July 2007.**

Radiation Protection

Of interest to the radiation protection community the ICRP have now approved the revised ICRP Recommendations on Radiological Protection. Future publications on Radiation Protection in Medicine and Patient Dose in Multi-Detector CT will also be of interest.

Matthew Paris
Chair NZ Branch, Dunedin Hospital

From the Treasurer

By now NZ members should have received their annual renewal subscription. As you are aware, the Australian head office collects the NZ dues.

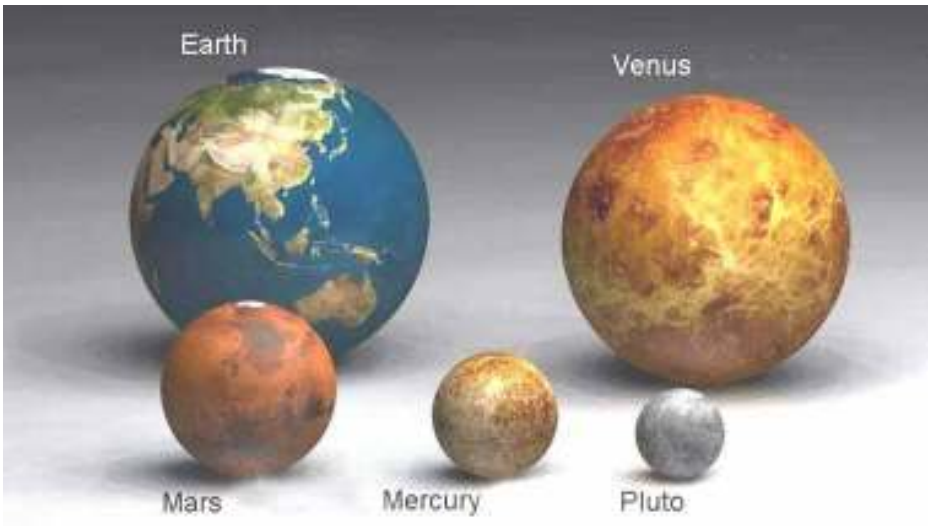
If your employer pays for your subscription, but is unable to pay by money order (A$) or credit card, it would be much appreciated if you would pay the dues yourself and then seek reimbursement from your employer. If paying with a money order (A$) or credit card creates a significant problem, please contact me (mark_dirksen@nrl.moh.govt.nz) to work out an alternative payment method.

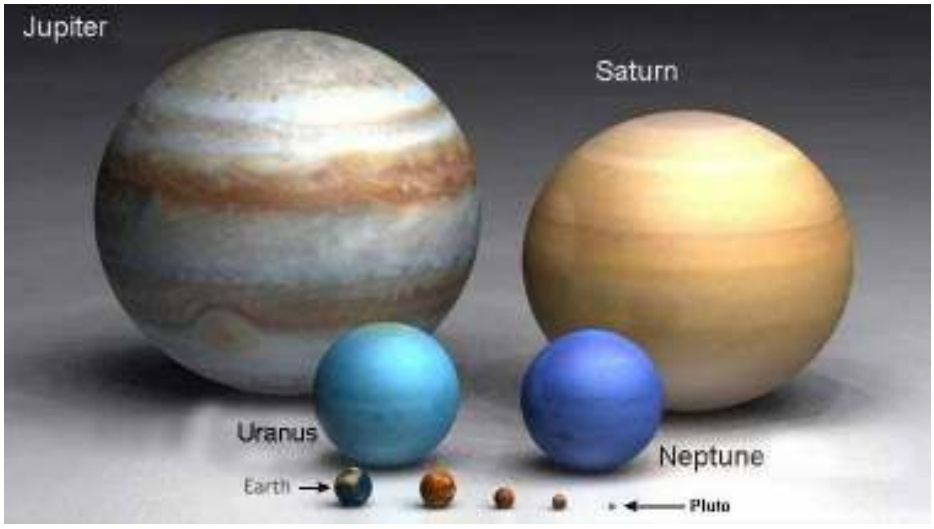
Mark Dirksen

Te Waihou Spring, nr Putaruru, Waikato

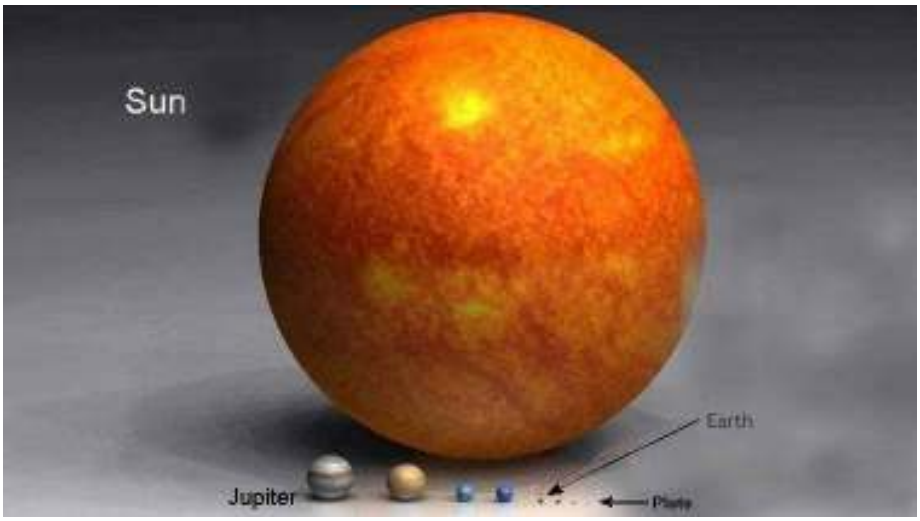
A perspective on the Solar System

Just in case you've ever wondered about the relative sizes of the planets





Jupiter thought he was the Big Guy on the block until the Sun turned up.



News from Palmerston North

Like most centres we too have had a significant waiting list issue – but to help compound the problem we had the superficial therapy unit fail, requiring replacement. Originally we had two kilovoltage therapy units in service. One was a Darpac SXR X-ray unit with a range of kV's available, 16 through 150 kVp and the other machine was a Siemens Stabilipan (140 through to 250 kVp). Both machines were getting quite old, with the Siemens being a true museum piece. Since 2004 the down-time of both machines has been quite significant and we were quite busy with maintenance. This resulted in the Stabilipan being decommissioned and only the Darpac replaced with a Gulmay D3105 SXR machine.

The Gulmay has a range of energies available from 30 to 150kVp.

In the interim some superficial lesions were treated with small electron beams on the linear accelerator, while a number of other patients were transported to Wellington Hospital and treated on their superficial machine. Work has been done to demonstrate the dosimetry characteristics of the superficial beams as compared to small field electrons, so should the situation need to be revisited, the clinicians have some useful data from which to make their decisions.

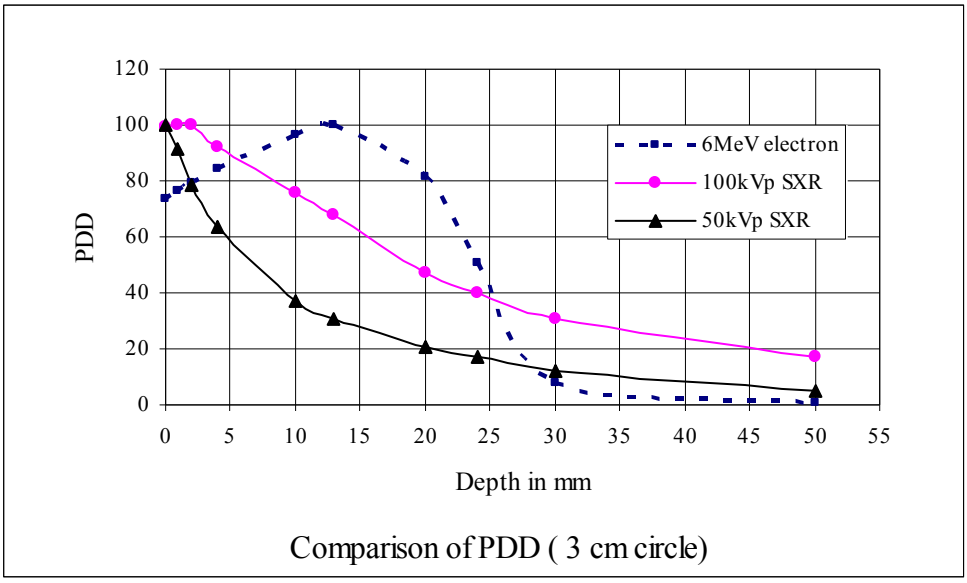


Figure 1: Graph showing PDD's to demonstrate the difference between modalities

Medical Physics Group, Palmerston North

News from Wellington

Wellington Blood and Cancer Centre continues to be a hive of activity with our recently commissioned HDR Brachytherapy service and Philips Brilliance CT scanner being used clinically since the beginning of the year. Developmental work will continue for some time associated with these two items as new treatment techniques are investigated and implemented. The HDR brachytherapy service is currently providing treatment for gynaecological

cancers, with treatments for prostate cancer in the pipeline. One of the exciting aspects of the new CT technology is the ability to perform more refined image guided radiotherapy techniques. Bryn Currie will be attending the Respiratory Gating Workshop at the Peter MacCallum Cancer Centre in May to further the department's aims in this respect. A third linear accelerator is still being planned for later in 2007.

While on the subject of workshops and conferences: Ekta Jhala and Tony Venning attended the ESTRO radiotherapy treatment planning workshop in Dublin in March. Both thoroughly enjoyed the experience and learnt a good deal as well. Tony's enthusiasm was of particular note with his eagerness to share his 42 field IMRT plans being well appreciated by the tutors, plus his dress sense and River Dance impersonations were impeccable. The Wellington medical physics group are organising an HDR brachytherapy and kV dosimetry workshop for TEAP registrars in May, so we will be looking forward to an influx of eager minds to soak up knowledge and the fantastic Wellington weather. The medical physics group is also gearing up for the NZ Branch conference later this year, no doubt you shall hear more in the next newsletter as we approach conference time.

Ekta celebrates handing in her Masters' thesis

Bryn has completed his MSc titled "Monte Carlo Investigation into Superficial Cancer Treatments of the Head and Neck". The work lead to the construction of isodose distributions for superficial x-ray fields incident on ear, nose and eye sites. There were some interesting features of these dose distributions that allowed for a meaningful comparison to be made with MeV electron beams in the same sites. He will be publishing the work as a journal paper in the near future. Ekta has received confirmation that her thesis on the dosimetric characteristics of EPIDs has been accepted and she will graduate with an MSc for the second time in New Zealand some time soon.

John Turner has joined us for ten weeks as temporary clinical training supervisor for the registrars both medical physics and radiation oncologists. His knowledge and enthusiasm is greatly appreciated by the registrars, especially the medical physicists as they gear up for the ACPSEM TEAP September theory exam.

Our dynamic English duo, Alan and Louise Gately, are not long with us as their tenure expires in July. Their input into the department has been fantastic and their observations on the Kiwi way of life are always entertaining and enlightening Another medical physicist will be joining us in June from London to fill part of the void, we trust that he will love his time in the vibrant city of Wellington and not be put off too much by the infrequent dose of wind we get on odd occasions. (*err – very nicely put – Ed*)

Bryn Currie

News from Christchurch

We recently welcomed **Ian Honey** (lately from KCARE) as locum Radiation Advisory Officer. The incumbent, Kate Packer, is currently relishing motherhood of baby William. This month **Grant Wylie** joins us to develop his skills as a surgical instrument technician. Amongst his other accomplishments **Grant** is an established sculptor. **Steve Marsh** (PhD) has accepted the Nuclear Medicine registrar position, but we won't see him till he completes the Medical Physics Masters papers this year.

Jenny Lydon will be joining us mid-year to take up the Principal Physicist Oncology position. Jenny has recently graduated PhD from the University of Melbourne with her thesis on "Monte Carlo modelling of narrow photon beams". She has worked with Radiation Oncology Victoria since 1993, the last 6 years as a Principal Physicist.

John Turner has disappeared off to Wellington for a few months. Good luck Lynne; we would like to see him back here though when you have finished with him!

Several of the younger staff learnt just how tough their seniors are when they took part in a 6 hour Adventure Race recently.

Anthea Craig (RT), Drew Winter (RT), Ben Wilder, Andrew Blair, Rob McLeod, Ian Honey, Richard Dove, Nick Cook, John Turner & Steve Muir. Not sure why the two ex-pats have their t-shirts inside out

Richard Tremewan

John Turner from Canterbury University reviews a students' plan using CMS Extreme Planning capabilities during training of a different sort.

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News from Auckland

So what has been happening in Auckland since the last newsletter? In February we had 2 new recruits to the department, both from the northern hemisphere. Stephen McCormack has joined us from Leeds and Christopher Thompson has come from Hull. Both of them have already been helping the rest of us to keep on top of the continually full inbox of plan checking! I would like to take this opportunity of welcoming them both to NZ.

IMRT is currently top of the agenda and we are in the process of setting up a working group to look at all aspects of the work that will be involved with implementation in the department. Jared is just about to submit his Masters thesis which means that hopefully we will be able to surgically remove his hands from his computer keyboard once again! Deirdre Hutton is currently on maternity leave again having given birth to her second daughter Roisin, so congratulations Deirdre!

Moving onto sporting achievements, Isla has just returned from a trip to the States to run the Boston marathon, Allan is reporting ever decreasing numbers on the golf scorecard, and a few of us decided last weekend that a far better place to convene a radiation therapy multidisciplinary meeting would be on the top of Mt Tongariro!

I just recently attended the TROG trials annual conference in Rotorua which was on 11-14 April. The preliminary day was a technical workshop aimed predominantly aimed at RTs and physicists. This included some very useful presentations and discussion sessions which all emphasised the need for an increased involvement of technical staff in the management of clinical trials. The main body of the conference was then taken up with presentations about completed trials, trials in progress and new proposals. From a physicist's perspective it was very interesting to hear about the large amount of work that goes on during the lifetime of a clinical trial, and it is only in more recent years since trials such as RADAR that we have had a more active part to play. Anyone involved in Radiation Oncology can become an affiliate member of TROG for free, so I would encourage all physicists and technicians out there to have a look at the new website being developed www.trog.com.au and think about signing up.

Right, that was the work bit, so it only remains for me to pass comment about the food and entertainment! Well the food was fabulous, and there was plenty of it. The entertainment was also excellent as a few photos below show. We also had a wine tasting session at one of the evening dinners which they had to twist my arm to take part in, and then there was always the

famed TROG piano bar to retire to in the evening where a couple of very musically talented doctors played the piano while the rest of us tried to sing along in tune as much as possible! I'm surprised you didn't hear us all around the country actually!

Fiona Bignell

We scrub up well if required! Fiona (on left) collaborating with RT's / nurses from Auckland, Wellington and Christchurch.

News from Dunedin

For the last few months at the Dunedin radiotherapy department there has been an increasing bustle of activity as the bunker for our new linear accelerator is fitted out in readiness for its installation in June. There will be a collective sigh of relief once all the traffic, noise, and altered schedules have finished. The finished product should be well worth it though and we all look forward to the up to date machine with its kilovoltage on board imager.

Peggy Edmonds and I attended the CMS Users Meeting, 27-29 April in Sydney. CMS is one of the main suppliers of radiotherapy treatment planning systems around the world. These meetings are not only valuable for updates on what imminent system upgrades will feature but also as a forum for developments in the radiotherapy field. There were a variety of

interesting papers on topics such as image guided radiotherapy, adaptive radiotherapy, and radiobiological evaluation from treatment planning systems. Thanks to the people of St. Vincent's Private Clinic who hosted and organised the meeting along with CMS. The sights of Sydney and its harbour provided the perfect backdrop for the meeting, social events, and free time.

Danny Warren

The History of Medical Physics and Biomedical Engineering in New Zealand – Part 1

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.

The first extract details some early memories of medical physics in New Zealand and goes back to 1899 with the first x-ray machine in New Zealand. I hope you enjoy the read, and a special thanks to David and Hugh and the book's other contributing authors Bruce White, Ray Trott, Jack Tait, and Gordon Monks (all present in the photograph included in this first extract).

Brian Lunt

EARLY HOSPITAL PHYSICS IN NZ: SOME MEMORY FRAGMENTS (1945-95)

THE BACKGROUND SCENE:

It's more than fifty years, depending on criteria! Through John Strong Lectures, we know of the early radon plant set up by Noel Hill (then a part-time physics student) at Wellington Hospital in 1925, but in Dunedin I found a 1921 letter about "one package of radium bromide" sent to "Professor R Jack, Otago Hospital & Charitable Aid Board, Dunedin". Bobby Jack was then Professor of Physics; he also set up the first radio station in NZ; in 1945 he was a player in having Warren Sinclair appointed as the first full-time hospital physicist in NZ.

X-rays were demonstrated in Dunedin on August 26, 1896, to the Otago Branch, NZ Medical Association; 8 months after Roentgen's discoveries (A C Begg, NZ med J, 1975, 82 1-5). Diagnostic radiology soon spread - I still have an original print of a hand radiograph taken in 1899 in Dunedin; many centres started X-ray work by 1910. There were many sad stories: "...Dr Ewart of Wellington Hospital worked his machine in the cellar stripped to his singlet because of the heat. With the soft X-rays his chest showed a curious mottling which gave him warning of danger. He suffered burns

in the hands...." (C C Anderson, Histoire Generale de la Radiologie, no's 57-59,Sept-Nov 1956).

And radiotherapy also started early - "...Dr Hosking of Masterton set up a private plant with electrical treatment apparatus and a supply of Radium. Being a pioneer, his work was ridiculed, but before 1910 he showed a case of proved epithelioma of the lip. The lip was diagnosed microscopically, cured with Radium..." (C C Anderson, 1956). There is a lot of early documentation from around the country, much of it written up by Dr Colin Anderson, Radiologist, of Invercargill, and by Dr Cameron and others active in the early days.

More into the hospital physics scene, I came across mention of "radiation dose" in roentgens in a Dunedin patient's notes dated 1932, which was not long after the original definition of the roentgen in 1928 (and extended in 1937). In the UK, professional hospital physicists were appointed from 1914 onwards, with early names such as Russ, Hopwood, and Mayneord.

THE FIRST NZ HOSPITAL PHYSICIST:

Our first full-time NZ hospital physicist, Warren Sinclair, started work at Dunedin Hospital on November 29 1945, just after completing an Otago M Sc (Hons) degree. The conditions of appointment are interesting, and a model of brevity since lost when one looks at present-day "job specifications:

" DUTIES OF RADIOLOGICAL PHYSICIST

1 Two hours per week for lectures in Physics to students of Diagnostic Radiology
2 Six hours per week as Assistant in Physics Department under the direction of the Professor of Physics
3 Practical instruction of Diagnostic Radiologists at Physics Department and Hospital
4 Duties as Physicist to Hospital Board and Cancer Research Committee.

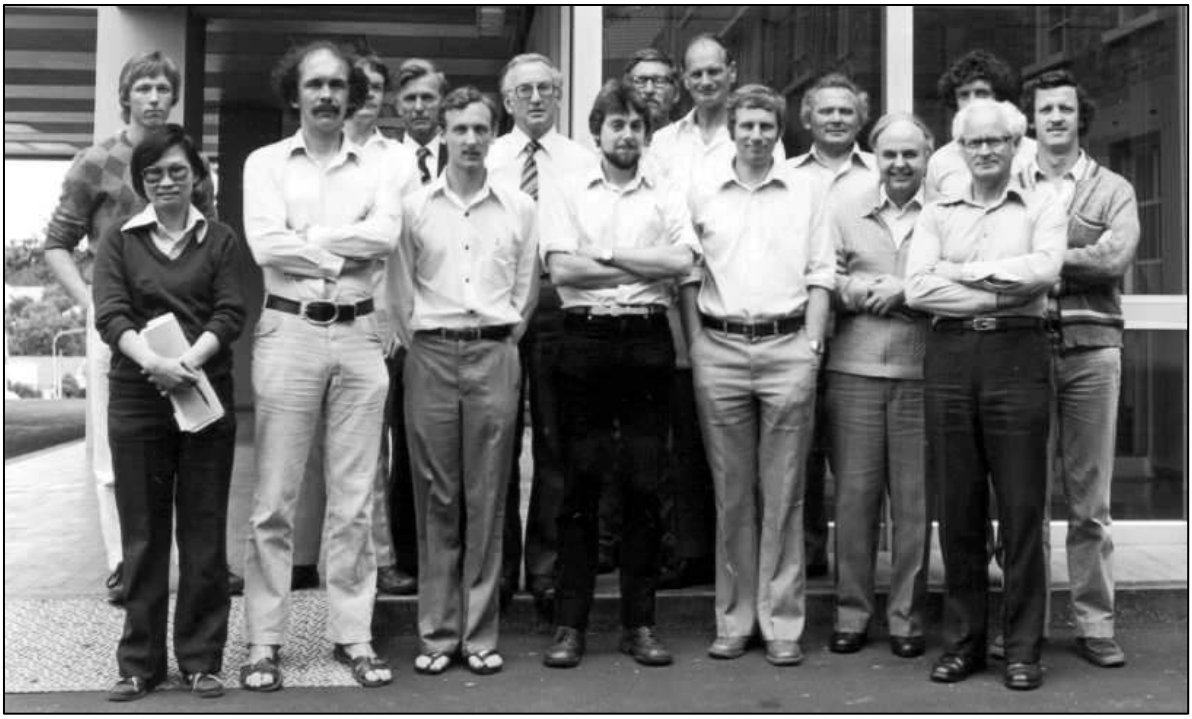
The person appointed will be under the direction of the Professor of Physics. "

This set up a clear connection with the Otago University Physics Department which was invaluable; indicated the new Otago DDR; gave a connection with the Cancer Society (then BECC); and a broad-based appointment (not just radiotherapy). When I began in December 1947, the same conditions applied, and it was useful to dust them off from time to time to establish status. The starting salary was fixed at 500 pounds per annum ($1000 pa), which then was about 50% above the starting salary for a secondary teacher. It included $100 from the University of Otago and $100 from the BECC.

The original physics equipment included a Victoreen R-meter (purchased by the hospital in 1938), a 0-2 mR/min Victoreen ratemeter, and very little else. Warren obtained a set of "isodose curves" in July 1946 from the Royal Marsden Hospital,

London, a slide rule, a basement office (of course! Where else would you expect to find a physicist?) and began treatment planning with no other help except a 2-week visit to the National Radiation Lab in Christchurch, where he met George Roth and Bert Yeabsley. By late 1946, Warren was corresponding with John Read in London about the British HPA Diagrams & Data Scheme (included isodose curves, physics data, etc) which John Read was instrumental in setting-up.

Radiotherapy equipment in Dunedin was good! It included a new Westinghouse 200 kVp Quadrocondex as the main X-ray unit, with an older 200 kVp GE Maximar, a 60-140 kVp Dermadex for superficial therapy, and a Philips 50 kVp contact therapy X-ray unit lurking unused in the shadows. And of course, a good supply of radium tubes, needles, plaques and seeds. There was a newly appointed UK-trained radiotherapist, Dr Peter Jerram, recently discharged from the NZRAF/RAF where he served during the war as a radiologist. He was very concerned at some legal cases due to overdosage in other NZ centres. Dr Bill Sowerby, Radiologist, also helped in obtaining establishment for a physicist. A radiography course (radiology and radiotherapy included) was also set up in Dunedin in 1945, by collaboration between Radiology and Radiotherapy.



(Left to right) People at NZMPBEA Conference, Hamilton 1981 (Courtesy NRL)

(Back) Peter Metcalfe, Fergus Thomson, Gordon Monks, Hugh Jamieson, Bill Artner, Ray Trott, Tom Rogers, Lee Dakers, David Armstrong
(Hamilton) (Auckland) (Hamilton) (Dunedin) (PalmerstonNorth) (Christchurch) (Auckland) (Christchurch)
(Front) Miss Y C Chan, Malcolm McQueen, John Poletti, John Le Heron, Martin Pracy, Bruce White, Jack Tait
(Hamilton) (Dunedin) (NRL) (NRL) (Hamilton) (Auckland) Christchurch)

So the stage was set - but no Physics workshop facilities, no supervoltage radiotherapy (except an overseas handful of 1MV machines, one at St Bart's London; a few in USA), no artificial radioactive materials, no calculators (except log tables and slide rules!), no computers, and no other hospital physicists in NZ; only NRL in Christchurch with 2 physicists busy with radiation protection and dose output checks around NZ centres.

Mr R L Luke and HDJ with the original radiograph of Mr Luke's hand taken in 1899, in Dunedin. On this occasion, Mr Luke was back for a '75-year follow-up' radiograph - a unique record.

(..extract from a later chapter)

There is very early documentary evidence of the use of X-rays in Dunedin. Dr de Lautour procured an X-ray unit in January 1899; he wrote the first radiological paper in NZ - "The localisation of foreign bodies by X-rays" in the NZ Medical Journal, 1900. I have an original radiograph taken by Dr de Lautour dating back to 1899, given to me in 1955 by the patient, who was a lad of 12 in 1899, and had shotgun pellets in his hand from an innocent rabbit-shooting expedition.

ESTRO –Teaching course on Radiotherapy Treatment Planning: Principles and Practice

Dublin, Ireland. 25-29 March 2007

The 5 day radiotherapy planning course was held at the St. James Hospital in Dublin and was attended by approximately 80 people representing 33 countries. Only 3 countries of which were from the Southern Hemisphere. Needless to say the New Zealand contingent, Ekta Jahla and I, both medical physics registrars from the Wellington Blood and Cancer Centre (WBCC), had traveled the furthest to attend the course. The majority of attendees seemed to be physicists but there were also a number of radiation therapists and oncologists present who all came with a broad background of knowledge. The course was run by the University Of Dublin Trinity College, School of Radiation Therapy and was delivered by a mixture of radiation therapists, oncologists and physicists who brought a wide range of expertise and knowledge to the course.

Ekta and Ola Holmberg (Course Director and Chief Physicist) from University Hospital Herlev, Denmark.JPG

The main focus of the course was on the clinical aspects of treatment planning. On the first day the lecture content consisted of radiobiology and molecular oncology, ICRU recommendations and image acquisition while subsequent days were dedicated to prostate, breast, head & neck and lung treatment planning. The main topics covered for each specific site were anatomy and pathology, different dose fractionation regimes, patient setup and verification and the different immobilisation techniques.

Group discussions consisting of approximately 10 people were held with each person talking about certain planning and setup techniques that they use in their clinic. The discussion included how and why they were using a technique and the problems associated with it. The main findings from each group were then presented to the entire group for a broader and more in-depth discussion.

There were a number of planning workshops during the course. With 80 attendees there were approximately 2 people per planning computer. The planning system used was developed by the Planning University of North Carolina and is known as PLUNC, which is a non-commercial system. This meant everyone was on the same playing field so to speak as no one had used this particular system before. It took one session, approximately 2 hours to become familiar with the basics of PLUNC. Exercises were given to follow in a step by step manner and ample assistance was available from the planning students who offered their tutoring services.

The specific sites that were planned on were prostate, breast and head & neck. Prior to planning several possible techniques were described to optimize dose distributions. Plans produced and optimization techniques used were naturally tainted with each person's departmental training and background. At the end of each planning workshop discussions were held on the advantages

and disadvantages of various plans. This was interesting from the perspective of how variable planning techniques can be to achieve the same outcome.

Ekta and Tony at Trinity College in Dublin.JPG

In an attempt to show that New Zealand is leading the way in radiation oncology treatment planning I developed a 42-field IMRT breast plan which, as you may imagine came under quite some scrutiny. While it was deemed to be a good plan they assured me that it would never be clinically implemented ☹.

Overall it was a high-quality course that was well run and was certainly worth traveling all the way round the planet for! The course would be suitable for medical registrars, medical physics registrars and also radiation therapists and anyone who is embarking upon the extensive world of radiation oncology treatment planning. From discussions with other attendees, those who had been working in radiation oncology for a while found the course at a relatively basic level. However, the course does cover a number of techniques and the latest ideas about treatment planning. Some very useful discussions were held with people from international departments which was very beneficial for the WBCC since we are about to make the transition from 2D to 3D breast planning.

The course dinner was quite an event which was spent in a typical Irish pub in the Medieval District of Dublin. Guinness along with just a little Jamieson's Irish Whiskey and some fine Irish cuisine was consumed while Irish dancers entertained to the rhythmic beat of Irish music.

Many accolades and thanks to the fabulous teaching staff who put together a grand performance and were always enthusiastic and willing to discuss numerous aspects of radiation treatment planning. Their time and effort was well appreciated! Well done and top of the morning to you!

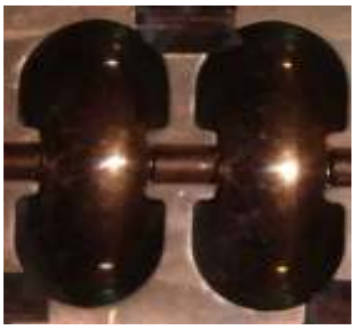
Anthony Venning

It's The Answers to Fiona's "Name That Accelerator Part Competition Time!"

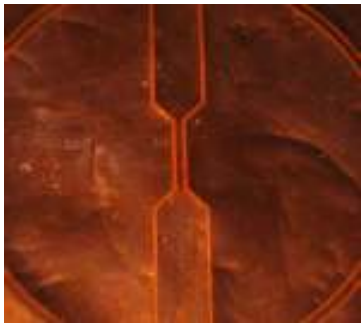
I have to say I was slightly disappointed with the lack of entries to the photo challenge that I posed in the last Newsletter. However I am pleased to announce that there was one clear winner with 6 correct answers, so the prize of the nylon Elvis costume and black quiffed wig will be winging its way to Bryn Currie in Wellington ready for a rendition of Hound Dog at the next Branch meeting…**So congratulations Bryn!**

And for those of you just dying to know - here are the answers…

1. Cross section of waveguide



2. One of plates in ion chamber



3. Cross section of magnetron

4. Section of bend magnet just after energy slit

5. Electron Gun

6. SF6 filled RF waveguide

The second training workshop is to be hosted by the Blood and Cancer Centre, Wellington Hospital over the period 14th – 17th May.

Registrars should have by now approached the relevant seniors to obtain approval for study leave and costs.

The course seeks to address the requirements of the TEAP syllabus with respect to HDR Brachytherapy and KV Dosimetry Protocol Implementation. To this end we shall provide theory and practice through a course of lectures, practical demonstrations and hands-on experience.

NZ TEAP Training Workshop, Wellington May 14th -17th 2007

HDR Fundamentals	HDR Dosimetry	HDR Clinical Application (Intracavitary Gynaecological)	KV Dosimetry Protocol Implementation	KV Dosimetry TRS 398
Brachytherapy overview ; LDR to HDR; scope of this training	Source Calibration - Source strength specification - traceability - methods - quality control	Applicator Design and dose distributions	Introduction to Dosimetry Protocol Implementation	Specific TRS 398 Superficial range Orthovoltage range
HDR Brachytherapy Sources - Radionuclide - Design	Source localisation - Radiographic methods - Volume Imaging	Treatment Delivery		Workshop on template development
HDR Brachytherapy Treatment Systems - design - quality control	Dose Calculation Models	Clinical systems - Manchester - MD Anderson - Volume Imaging and GEC ESTRO recommendations		Practical measurements
Radiation protection - facility design - personnel safety - patient safety	Treatment Planning - Optimisation - Dose Specification and Reporting - Quality control -	Guide to legislation, codes of practice and other published recommendations		
Practical Radiation Protection	Practical HDR Dosimetry	Practical HDR Treatment Simulation		Practical KV workshop

Please *confirm* your attendance and whether or not you will require accommodation. At the present time accommodation options are:

- ***Stratford Apartment Hotel*** (JRT recommended!) $109.00+ GST (This is a special rate that we have secured for a block booking. It is a studio room in a brand new Apartment Hotel. It is located at the hub of the city and only a short walk to the bus for the hospital. We need to get about ½ dozen bookings. Go for it!)
- ***Wellington Backpackers*** (Close, satisfactory) $80.00 (This is NOT a typical backpackers! It is an en-suite room with common room and other facilities. It is within a 20-25 min walk of the Hospital and 5 min to the City Centre)
- **YWCA** (basic, not en-suite) $65.00

Most other options for single, en-suite accommodation within a 30 min walk/15 min bus are in excess of $ 150 per night unless you go for a motel unit and share with a colleague!

All enquiries by email please to:
John R Turner and/or
Lynne Greig
Course Facilitators

lynne.greig@ccdhb.org.nz
and
john.turner@canterbury.ac.nz or
john.turner2@cdhb.govt.nz