Sinaran • JUNE 2008
MALAYSIAN SOCIETY OF RADIOGRAPHERS
Affiliated to The International Society of Radiographers and Radiological Technologists (I.S.R.R.T.)

CONTENTS

INTERNATIONAL SOCIETY OF RADIOGRAPHERS & RADIOLOGICAL TECHNOLOGISTS

The Asia-Australasia (A&A) Regional Committee of the ISRRT meeting was held on 22.4.2008 at the Hilton Hotel, Durban, South Africa. It started in the afternoon at 3.30pm and ended at about 5.30 pm. The meeting was chaired by the Vice-President of the ISRRT for the A&A region.

A short meeting of the Asian-Australasian Conference of Radiological Technologists followed after that. The conference which would be held next year will be hosted by the Malaysian Society of Radiographers in Kuala Lumpur, Malaysia.

Prior to the A&A Regional Committee meeting, the President of the ISRRT, Mr. Robert George presented the Strategic Plan of the ISRRT to the full council members.

The Council Meeting of the ISRRT was held the next day on 23rd April 2008 with very good attendance of council members from member countries. It was a long meeting taking up the whole day, beginning from 9am. and ending at 5pm.Nevertheless the council members, including our President sat through it the whole day discussing and debating issues regarding the world of medical imaging and medical radiation sciences.

I would like to highlight three issues that were agreed by the council members as conveyed to me by our President:

1. A change in the logo of the ISRRT. The new logo for the ISRRT will soon be appearing in all events and matters with regard to the ISRRT. The new logo will portray the advancement and current situation of the profession as well as the field of medical imaging and medical radiation sciences.
2. Africa which was formerly grouped together with Europe and under the purview of the Vice-President for Europe-Africa is now separated. It now has its' own Vice-President for the African region. This is in line with the expanding needs of both regions coupled with the increase in the number of member countries from each region.
3. The ACRT (Asian Conference of Radiologic Technologists) shall now be called AACRT (Asian-Australasian Conference of Radiologic Technologists) with immediate effect. This is in line with the A&A Regional committee of the ISRRT. The coming event in Kuala Lumpur shall be known as the 17th AACRT 2009. Hope to see all of you there.

Editor

Durban is a modern, vibrant cosmopolitan city with a population of 3.5 million people situated on the lush tropical eastern shores of South Africa.

It is slightly more than ten thousand kilometers away from Kuala Lumpur by air, and the flying time is eleven and a half hours. That distance and the long flying hours did not affect my enthusiasm and forward expectations of the 15th ISRRT World Congress.

For the first time in the history of South Africa, an international congress of this magnitude is being held on African soil, hence the vibrations, excitements and enthusiasms ran high.

This is my fifth straight participation as a speaker in ISRRT conferences since 2000, and I look forward to meeting old friends again, and foster new friendships while at the same time broadening my network. The ISRRT conferences have brought me to both sides of the world and also up and down under.

I touched down at Durban International Airport on 23rd April 2008 at approximately 10.30am local time, and was met by the welcoming committee. They then whisked me to my accommodation at the Protea Edward Hotel situated along the golden mile beachfront.

Thursday 24th April (1st Day)

The congress was held at the Durban International Convention Centre, also known as the Inkosi Albert Luthuli Convention Centre.

Registration started as early as 8.00am and it went smoothly. The registration was done accordingly in alphabetical order, regardless of country or institution. The congress this time saw a varied mix of participants of not only radiographers (therapy and diagnostic), but there were also radiologists, nuclear medicine physicians, nuclear medicine technologists, dosimetrists, sonographers and medical physicists. Those were the ones that I met and talked to. After registration I went around looking up old friends to catch up with the latest news and happenings in the world of medical radiation sciences.

A welcome brunch was served at half-past ten in the exhibition area. I found this to be a favourable arrangement because the participants could see the exhibition while at the same time enjoy the food. This was the arrangement throughout the congress, and this way the exhibitors were happy since they were never short of visitors.

The official opening ceremony started with a prelude of African drum beats by a group of drummers (equivalent to our kompang), and this was followed by a choir presentation by the City of Durban Children's Choir.

The flag parade of each member country was next on the agenda, and our Malaysian flag was proudly paraded in by our President of the Malaysian Society of Radiographers.

Tuan Hj. Mohd. Zin, President MSR, bearing in the Jalur Gemilang during the official opening ceremony.

Dr. Fozy Peer, Congress Convenor delivered her welcome speech and urged the participants not only to enrich themselves from the informative and stimulating academic programme, but also to interact and share our experiences with colleagues from around the world.

The President of ISRRT, Mr.Robert George, officially declared open the 15th ISRRT World Congress. He gave the assurance that the participants will gain professionally and personally from the world congress in view of the fact that the convening committee has assembled a faculty of experienced and interesting speakers from many countries. In addition the participants will have the opportunity to share and learn the experiences of over 750 professional colleagues from over 45 countries. With the congress officially declared open, the show began.

It has always been the tradition of the ISRRT World Congress that the Hutchinson Lecture followed immediately after the official opening ceremony. This keynote lecture was delivered by Mr. Philip Metcalfe, Unit Head of Radioactive Waste and Spent Fuel Safety of the International Atomic Energy Agency (IAEA). His lectures were entitled : [1]The radiation safety paradigm – Evolution and perspectives, and [2]Radiation protection and upgrading regulatory infrastructure.

Four plenary lectures followed after the keynote lectures, delivered by prominent speakers. Dr E P Akpan, a former President of ISRRT took us on a journey of Medical radiography profession; its education and role development, while Professor Dr.H Vogel exposed to us the stark reality of Nuclear terrorism; Radiological threats from dirty bombs, nuclear weapons, and power plant accidents.

Dr S Martino of the American Society of Radiologic Technologists (ASRT) brought us back to the serenity of our profession with his presentation of a Survey on International Advanced Practice which I and Tuan Hj,Mohd.Zin gave some inputs in response to his survey questionnaires. We were delighted when the response from Malaysia was flashed onto the screen.

Dr P White wrapped up the first day with a presentation on the Code of conduct for radiographers.

All in all it was an invigorating start for the first day, one that perked up your mind looking forward to more over what to be expected for the next three days.

Friday 25th April (2nd Day)

Safety and security of the participants must have been of great concern and a priority for the organizing committee. Before going to Durban, I asked many friends about the situation in Durban in particular and South Africa in general, and almost all of them advised me to be extra vigilant and alert and not to walk about alone, especially after 6pm and definitely not at night. A couple of Malaysian businessman I met on the plane also advised me the same thing and so did the hotel staff as well. The locals even advised me to blend in with the crowd by dressing up like them and not to be seen as a foreigner, and not to carry too much money. A camera and or cell phone clipped to your belt or seen dangling around your neck or shoulder is a no-no and a dead give-away that you are an outsider and a prime target for robbery.

Hence the organizer provided shuttle services for all the participants staying at all the various hotels throughout the entire congress period. The shuttle was provided at every 15 minutes from 8 – 9 am daily and therafter at every hour.

The second day was equally interesting and the topics were arranged in such a way that it was impossible for me to run from one hall to another to listen to all the presentations that stirred my professional yearning for the knowledge to be gained. It was a difficult choice to make and I finally settled for the varied and interesting radiotherapy presentations, and thus it was to be so for the second day.

That night a beach party was hosted by the Deputy Mayor of the City of Durban at the U-Shaka Marine World. I was looking forward to it because a beach party would be a real fun time for the participants after a full day of lectures. Memories of the beach party at Barbados in 2001 during the 5th ISRRT Conference of the Americas were still fresh in my mind and it was an unforgettable moment.

Alas I was disappointed because the beach party was not really a beach party. It was not held on the beach but on a shipwreck that has been refloated and turned into an aquarium. So while having the party the participants could watch the fish in aquariums at various sections of the ship to the accompaniment of a live band. There was music and dancing on the upper deck. I took the earlier shuttle back to the hotel since my presentation would be on the next day. It is my usual norm to go over my presentation the night before especially at a world congress of this stature.

Saturday 26th April (3rd Day)

The papers and posters presented at the congress were all very interesting covering almost every aspect of medical radiation sciences, in particular the field of radiation therapy and diagnostic imaging. As previously mentioned I found it very difficult to hop from one hall to another, so I decided to concentrate on just the radiotherapy presentations.

On this third day there were two presentations from Malaysia. Our President, Tuan Hj. Mohd.Zin invited all the participants to the 17th AACRT to be held in Kuala Lumpur next year via his presentation on the ACRT promotion. Between us we distributed all the flyers that were brought to the congress together with the souvenirs which the Malaysian TDC sponsored. By the morning coffee break on the third day all the AACRT flyers were snapped up. Hopefully the response to the flyers is a favourable indication towards our hosting of the 17th AACRT next year. We just have to wait and see.

President MSR promoting the 17th ACRT

My presentation entitled Stereotactic Radiosurgery (SRS) for AVM – The results, was slotted in the afternoon after the lunch break. The other presentations were equally hi-tech in nature and we were grouped together in session 3.

It was just an unfortunate moment at that time that my sore throat politely chose to be present (due to the beach party?). Nevertheless my presentation went well with a bit of crackle in my voice and was very happy that it was well received when two of the participants (one was also a speaker) later came and congratulated me, asking questions and discussing experiences with regard to SRS. Together we shared our knowledge and expertise in SRS and other advancements in radiation therapy and related fields.

We were all fascinated and intrigued by the hi-tech papers presented and I personally wish that we could have similar sophisticated equipment so that we could enhance and boost the radiotherapy services in the country. However we were jerked back to reality at ground zero when one of the presenters presented a heart wrenching situation at her country.

They only have one cobalt-60 which is already 10 years old and have never had a source change. So you can imagine the length of treatment time, and they are treating 100 patients a day (not 100 fields!). This is similar to a centre which I audited under the IAEA QUATRO Expert mission sometime in September 2005. In order to ensure that every patient got treated, they worked up till midnight! We are much luckier and better off aren't we?

That night was the official banquet of the congress. It was held at the banquet hall of the International Convention Centre. The guest of honour was the Deputy Mayor of the city of Durban. Many of the participants particularly from the African continent came in their colourful national or tribal costumes. It was a colourful night and the tables were set in black and white of the zebra stripes.

The food was good. There was a live band providing the music and after dinner many of the participants took to the dance floor and let their hair down, gyrating, swirling and tapping to the tempo of the music.

It was an enjoyable night and I had the company of our Asian colleagues at the dinner table, from Thailand (guess who), Hong Kong, Taiwan and Singapore.

Sunday 27th April (Final Day)

Today is the last day of the congress and I felt a slight tinge of sadness at the thought that these wonderful congregations have to end. The presentations in the morning were equally interesting as yesterday's. I decided to juggle between the sessions on management and education.

During the breaks I and Tuan Hj.Mohd.Zin had some private moments together with Dr.Sandy Yule, CEO of the ISRRT and Mr.Robert George, President of the ISRRT. On behalf of the Malaysian Society of Radiographers, we presented a gift of a batik painting to Dr.Sandy Yule and a replica of the Petronas Twin Towers to Mr.Robert George. The gifts are a symbol of friendship strengthening the bond of professional relationship between The MSR and The ISRRT and the member societies.

With Dr.Sandy Yule, CEO ISRRT

With Mr. Robert George, President ISRRT

The congress was well organized and the organizer gave their best effort in fulfilling the participants' needs and comfort right from the airport itself. The shuttle service between the hotels and the convention centre throughout the whole four days was very convenient for the participants, even though I would have preferred to walk instead. The organizing committee even converted one of the rooms into a prayer room for the muslim participants when I enquired for one.

The scientific committee really did a fantastic job in selecting and compiling all the papers for presentations. They were all very good papers and congratulations to them for doing a good job in arranging the papers in their rightful categories in the proper sessions. I am sure I was not the only one who found it difficult to juggle between the halls in order to follow the many interesting topics. Kudos to the scientific committee for a job well done.

The closing ceremony was held after lunch. The congress convenor, Dr.Fozy Peer expressed her gratitude to all the participants for making the 15th ISRRT World Congress a success, and an event to be remembered for a long time to come in Africa. It was an event that saw one thousand two hundred and forty-one delegates from member countries with more than half coming from Africa itself.

As with all ISRRT conferences, there was the usual presentation of gifts from the participating societies to the host society. I and the President of MSR, Tuan Haji Mohd.Zin proudly went up the stage and presented to the President of the Society of Radiographers of South Africa (SORSA), a batik painting and a scaled Royal Selangor pewter replica of the Petronas Twin Towers, a truly all-Malaysian gifts.

The President of ISRRT, Mr.Robert George snuffed out the flame of the 15th ISRRT World Congress to mark the end of the four day meeting, and officially declared the congress closed. He invited all the participants to the next 16th ISRRT World Congress which will be held at the Gold Coast in south east Queensland, Australia on September 9-12th 2010. The theme for the 16th ISRRT World Congress is "Tomorrow and Beyond: Connecting and Communicating". Well, see you in Gold Coast.

A visit to South Africa would not be complete if one do not go to any of the wild games reserves and watch the Big Fives (Big Fives are the lions, tigers, elephants, rhinoceros and hippos, and African buffalos) in their natural wild habitat. Since the congress programme was very tight we found it very difficult to fit in a visit to the wild game reserve.

Our only opportunity was after the closing ceremony on the last day of the congress. So it was, immediately after the closing ceremony I and Tuan Haji Mohd.Zin took one of the post-congress tours to the Tala wild games reserve which was about forty-five minutes away from Durban. We were told that the further it is the better and is much wilder. However we settled for what we had time for.

The Tala wild games reserve is about 7000 acres in area and the animals roam freely foraging for their own food. We boarded an open land rover like the one that you see in National Geographic or Animal Planet in African safaris. The ranger who drove the four wheel drive also acted as our guide and his knowledge of all the animals in the game reserve is simply amazing.

We saw only three of the big fives. There were also giraffes, bucks, impalas, deers, ostriches, springboks, moose, and hippos. It was a fantastic sight and experience watching the animals at close range in their wild (of course the ranger was very careful and alert for any sign of sudden reaction from the animals, particularly the rhinoceros).

Altogether it was an experience that only your presence could really express how it is and what is it like. It was a successful and well organised congress. Till we meet again at the 17th AACRT and the 16th ISRRT World Congress – cheers!

Mahfuz
Chairman Editorial Committee

Source-Ray High Frequency DIRECT-DIGITAL Portable X-Ray System

The SR-130D Direct Capture Digital Portable X-Ray system was designed for today's demands of general radiography, trauma and bedside care. The SR-130D utilizes Canon Medical System's CXDI-50G large format 14" x 17" x-ray sensor panel.

Direct-Digital eliminates the need for

- **films**
- **processors**
- **identification imprinting**
- **film storage**
- **darkroom**
- **safelights**
- **film bins**
- **processor maintenance**
- **and many more expenses**

At the same time, Direct Capture Digital Portable X-Ray system allows you to transfer images to remote locations over data networks easily. It allows you to "tweak" or enhance images after they are taken and much, much more.

Features:

- **Large Imaging Area** - ***Convenient*** 14" x 17" Format
- **Versatile Positioning** - Once in place, the digital detector provides ***high resolution digital images*** that can be stored on disc or sent to an off-site radiologist for diagnostic clinical evaluation.
- **Compact Design** - The ***compact design*** allows the SR-130D to be used for a wide range of X-ray applications.
- **Protective Storage** - Convenient storage box provides protection for the digital panel and grid adapter when not in use or ***during transportation.***
- **The SR-130D** system has an integrated touch screen computer with integral keyboard for selecting Anatomical Programming or manual selection of x-ray techniques. It also provides the ability to export study lists to PACS systems for clinical history and follow-up exams. The SR-130D is DICOM 3 compatible.
- **Easy Data Entry** - Enter patient data using convenient ***touch screen*** panel.
- **Anatomical Programming** - Select ***Anatomical Region*** of interest. Then ***Anatomical View.***
- **Fast Results** - ***View Image*** immediately. ***Magnify*** or ***Enhance*** image with on-board tools.
- **Manual Over-Ride** - ***Over-Ride*** any pre-programmed technique easily and quickly.

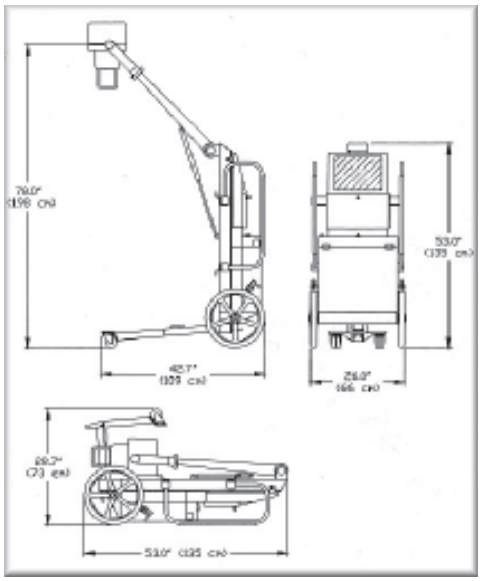
The Model SR-130D brings digital radiography directly to the patient. With a portable sensor designed for patient comfort and quick access to images, the SR-130D provides unmatched speed and efficiency for diagnosing even the most critically ill patients.

Components of note are:

1. **Generator:** HF resonant inverter - 3.0 kW
   Line Voltage: 115/230 VAC 50/60 Hz
   kVp Range: 40 - 100 kVp,
   adjustable in 1 kV increments - closed loop regulation
   mA range: Fixed, 15 mA and 30 mA - closed loop regulation
   mAs Range: 0.15 - 120
   Exposure Time: 0.01 - 4.00 seconds
   Indicators: Digital display of kVp, mAs and Time, X-Ray, Ready, mA Station and Fault Indicators
2. **Exposure Switch:** Detachable two position switch
3. **X-Ray Tube:** Stationary Anode 100 kVp
   Filtration: 2.7 mm al minimum
   Target Material: Tungsten
   Anode Capacity: 30,000 HU Storage
   Focal Spot: 1.0 mm
   Target Angle: 15°
4. **Collimator:** Advantech R72/32-ET
   Tape Measure: SID Measurement
   Inclinometer: Angle Measurement
5. **Computer:** RDP Health
   CPU: P4 2.0 GHZ
   Drive: 40GB
   Display: 15" TFT (Touch Screen)
   Ports: 10/100 Base T
6. **Digital Panel:** Canon CXDI Series
7. **Method:** Scintillator + Amorphous Silicon (a-Si)
8. **Sensor:** Amorphous Silicon (a-Si) Flat Panel Sensor
9. **Grid:** Attachable (Canon CXDI grid)
10. **Application:** Portable
11. **Pixels:** 2,208 x 2,688 pixels (5.9 million pixels)
12. **Image size:** Automatic sizing up to 14 x 17 inches
13. **Pixel pitch:** 160 x 160 microns
14. **A/D:** 14-bit
15. **Grayscale:** 4,096 (12-bit) grayscale
16. **Sensor Unit:** (W x L x T) 19.3 x 19.9 x 0.9 inches, 10.6 lbs
17. **System Weight:** 175 lbs / 79 kg

Optional Equipment

1. **Grid Adapter:** Attachable (Canon CXDI grid) 8:1, 103 L, 110 cm focus, with software which removes virtually all grid lines from the final image.
2. **MDR Express:** MDR Express records DICOM images (CD or DVD Format) in their original digital format, so there is no resolution loss. Installs a DICOM viewer application on each disc, allowing for easy image viewing.
3. **Mobile Access:** Saves images in DICOM-3 format and Station Image encryption (HIPPAA). Provides patient demographics to portable unit.
4. **DR Image Viewer:** (Basic Workstation) Features pixel-to-pixel display for viewing high resolution life-size images in addition to multi-study viewing for quick comparisons with other DR exams.
5. **DR Image Viewer:** (Additional Viewing) allows software to be loaded on additional remote computers.
   DR Image Viewer: (Stitching Application) Application for stitching multiple images together.



Stock #	Description	Your Price
900015	**Portable Digital X-Ray System Model SR-130D** - 3 kW Direct Digital Capture, 100 kV/30mA, 15/30 mA stations, microprocessor controlled, Folding Travel Stand, Advantech Collimator, Integral Panel Storage Box, Canon CXDI-50G (14" x 17") Flat Panel Detector, 15" TFT (Touch Screen) Computer, Canon Base Software, Canon MLT - Image Enhancement Software	$135,000.00
400061	**Optional:** Grid Adapter - 14" x 17", 8:1 103 Line 110 cm Focus	$3,400.00
400062	**Optional:** MDR Express Image Recorder (CD)	$7,000.00
400063	**Optional:** MDR Express Image Recorder (CD/DVD)	$8,500.00
400064	**Optional:** Canon Mobile Access Station Software (MAS) Allows the same software installed on the portableto be installed on another workstation seperate from the SR-130D.	$5,275.00
400065	**Optional:** Canon DR Image Viewer Software - Basic Work Station	$4,524.00
400066	**Optional:** Canon DR Image Viewer Software - Additional Viewing	$3,392.00
400067	**Optional:** Canon DR Image Viewer Software - Stitching Application	$3,392.00

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THE MALAYSIAN SOCIETY OF RADIOGRAPHERS 38th ANNUAL GENERAL MEETING & SCIENTIFIC SESSION 4th- 6th APRIL 2008, BAYVIEW HOTEL, MELAKA

The 3 day session kicked off on Friday night with participant registration and 2 presentations from vendor companies.

IDS Group was represented by **Mr. Faizi Kanan** (Pharmaceutical Manager) who gave a half hour presentation on Studies on Contrast Enhancement in MRI. He showed a video presentation on the Benefits of High Relaxivity MRI contrast Agents, an extract from the Bracco Education event in Barcelona in 2005. The presenters on video were Dr. Kenneth Maravilla, Professor from the Radiology & Neurological Surgery Faulty at University of Washington, USA and Dr. Alberto Spinazzi, MD, the Medical Director of Bracco Group Affairs.

Next we listened to **Mr. Wilfred Lim** the Managing Director of **Able Global Healthcare** brief us on Breast Laser Mammography.

After a late supper many radiographers went sight-seeing along the river, some even enjoyed the river cruise and a late night walk along Jonker Street to seek out local products from the hawker stalls that closed very late.

Day Two – 5th April 2008 8.00 a.m.

We resumed on Saturday morning with the Scientific Session. **Pn Habibah Ahmad was Chairperson** and conducted a very orderly session. She ensured all participants kept to their time limit and recapped each presenter's salient points at the end.

Paper 1 – Duplication of Radiographs Using Computed Radiography

The first presenter was the very learned and distinguished **Mr Subramaniam Ramanaidu** , current Head of College of Radiography **University Malaya Medical Centre** Kuala Lumpur.

The aim of the paper was to evaluate the effectiveness of using Computed Radiography (CR) to duplicate radiographs. The method employed for the process of duplication was based on the principle of eliminating the energy stored on an imaging plate (IP) using white light.

The radiographs duplicated were assessed by 6 radiologists using the image criteria recommended by the Council for European Communities (CEC). The results showed that a radiograph produced using a pre-exposure of 50 kV, 2 mAs and exposed to white light for 40 seconds was found to have the highest score and was comparable to the original. This radiograph was then compared to a conventional duplicate film produced in normal operating conditions and both radiographs were favourably assessed by the radiologists.

Mr. Subra has 34 years of working experience half of which has been spent as an educator. He has been a keen advocate in promoting the awareness of research among Malaysian radiographers and it will be a noticeable loss to us when Mr. Subra retires in May 2008. However we are very certain he will continue to contribute to the radiography profession even when he is away from mainstream medical imaging. We wish him good health and many thanks for his countless contributions to the society in particular and the profession in general.

Paper 2 – RELAY FOR LIFE

Next I had the opportunity to share the details of my organisations fund-raising event and community project called **RELAY FOR LIFE (RFL).** I recapped the highlights with lots of visuals. It was an event designed to promote cancer awareness in the community and celebrate the struggles and triumphs of the cancer patients.

RFL is an overnight event that lasts 16 hours with team members participating in a relay style walk or run around the track. This event was highly symbolic of the cancer patients struggle against the odds and their fight to triumph over the disease. Members of the public taking part in this event will be greatly moved by the courage and tenacity displayed by these patients and their caregivers.

This year RFL will be organised from 4pm 31st May 2008 till 10 am 1st June 2008 at the Training Stadium in Bukit Jalil. Be there and be among the many special people to continue the fight against cancer because as I said in my closing remarks – THERE IS NO FINISH LINE UNTIL WE FIND A CURE.

At the end of my presentation **En Faizal from Hospital Umum Sarawak** commented that it was a noble and exemplary event and the presentation had affected him deeply. He further stated his keen desire to attend the RFL this year. I was very touched by his comments and also later the feedback from other participants of their willingness to not only participate but also organise a smaller scaled event in their departments.

I truly hope that the MSR will adopt this activity as part of their community project as all radiographers have a role to play in the diagnosis and treatment of cancer patients.

Paper 3 – TSET (Total Skin Electron Therapy): Innovation for Protection

Ms Mahayu Ismail followed next with an excellent technical paper on the treatment of ***mycosis fungoides*** with electron beam therapy. Ms. Mahayu has 7 years working experience at the **Radiotherapy and Oncology Department in Hospital Kuala Lumpur** and is currently in-charge of the Linear Accelerator 6, which is the Siemens Primus.

There are not that many cases of *mycosis fungoides* and at HKL only chronic cases are treated with this technique. The early staged cases / isolated areas are treated by the plaque / cryotherapy technique. So TSET comes once in a while and each time it creates an excitement.

Ms Mahayu explained that initially low-energy X-rays were used, but clinical results were not encouraging due to the difficulty in treating the entire skin adequately, limitations of maximum field-size and field-junction and because it was not possible to treat to an adequate depth without a large X-ray integral dose (*at 10 cm depth the low energy X-rays isodose are still more than 40%).*

Thus, electron beams produced by linear accelerators were chosen because the maximum dose is just below incident skin surface and there is a rapid fall-off of dose in relation with depth to a maximum range determined by the electron energy.

Ms. Mahayu discussed the many complex problems associated with this type of treatment such as widespread scattering of electrons, Bremsstrahlung production (*when electrons are not stopped in the patient*), time consuming technique involving multiple fields and patient-positions among others.

She also elaborated on the patient care needed during and after treatment. It was a most interesting paper highlighting this rarely used treatment technique with detailed and precise information on isodose curves and patient set up. We certainly look forward to listening to Ms. Mahayu present again in the future.

Paper 4 – CT Blanpro©

The next presenter was **Ms. Chua Lai Lian** a Grade U32 radiographer attached to **Hospital Ipoh, Perak**. Ms. Chua has 29 years work experience and completed post basic studies in Computed Tomography (CT) in 2005.

Even though she is currently in charge of the mammography section in the department she has special interest in CT therefore leading to the inception and creation of the ***CT Blanpro©***. Ms. Chua actually weighed a typical lead gown and discovered that it is 5.2kg and as such may cause serious discomfort to a paediatric patient when placed directly on the abdomen.

Therefore she initiated a project that would have a 2 pronged objective.

1. To improvise a gadget for providing radiation protection to body parts which are not of interest especially the gonads in paediatric patients during CT examination.
2. Recycling old lead gowns which are partly torn or with broken fastening clips or seams but are still of protective value if modified.

Measurements for the amount of radiation received were done using a Survey Meter called the Unfors Educational Direct Dosimeter in a water phantom with the sensor placed at 50m from the source of radiation. Readings were taken with and without placing *the CT Blanpro©*. At the end of the study *CT Blanpro©* was found to reduce 77.14 % of the scatter radiation.

Ms. Chua ended her presentation by saying that it takes less than 2 minutes to put the lead sheets or the polystyrene box and challenged us to re-think our practices if the patient were our child? She also welcomed contribution of ideas to improve on *CT Blanpro©* from those who select to put it into practice.

Paper 5 – Malpractice in Radiography

After a short break the session resumed with a presentation from **Ms. Sabrina Ali Pichai** a final year Radiography student at MAHSA College. She is currently President of MMISA (MAHSA Medical Imaging Students Association) at her college.

She stressed that radiographers are recognised as health care professionals and have an increased responsibility that goes along with this recognition because patients are customers and expect high levels of service.

During her clinical attachment at 9 Government Hospital and1 Private Hospital observing an average of 200 patients a day she noticed a serious lack of using gonad shields for patients.

Therefore the issue arising here is; are the use of gonad shields required by law? There is no direct reference to any specific penalties for failing to apply gonad shields, however there may be general penalties for failing to follow established guidelines and as such the law expects you to use gonad shields.

This paper evoked a mixture of reactions from the participants and some queried as to whether there was an existing law requiring the usage of gonad shields.

Mr Subramaniam from Hospital Tunku Ampuan Rahimah Klang stated that while currently there were only guidelines and no actual law, we will in the near future witness the introduction of an Occupational and Safety Hazards OSHA Act. When this happens then radiographers may face a hefty fine / penalty or even be sentenced to a jail term if it is breached.

Her presentation was a wake up call for many qualified radiographers to seriously monitor their procedures and ensure it complies with the relevant codes and rules of conduct.

Paper 6 – Care of your Lead gown

En Mohd Aris Fadzulla Mahat is currently a radiographer with 9 years experience at the **Hospital Pakar Sultanah Fatimah, Muar, Johor**. This particular paper has been presented before in the "6th Johore Scientific Meeting in 2007". It asks a very important question: **Are your x-ray protective apparels protecting you from ionizing radiation?**

Any radiographer worth their weight know that X-ray apparels are necessary to protect oneself from harmful effects of ionizing radiation during diagnostic or interventional procedures therefore periodic maintenance is important to ensure adequate protection to the user. Staff and public protection from ionizing radiation depend on these material and its functions.

These 'protective apparels' were NOT SAFE and NOT in good condition due to improper handling, insufficient designated storage space and lack of awareness among users. En Mohd Aris stressed that proper storage and handling procedures with periodic quality assurance assessment of x-ray apparels were needed to safeguard the users. Finally he recommended that lead apparels test should be performed annually.

However the presentation sparked many queries about the test references needed for ISO Auditing and accrediting as these standards needed to be set by a physicist.

There is room for further development of this study that can benefit many because knowing that you are sufficiently protected is priceless. We thank Mr Muhd Aris for sharing his department's findings with us.

Paper 7 – Meningkatkan Peratus Lateral Servikal Erect Yang Sempurna

Ms Rushelawati Kasa is from Hospital Tuanku Fauziah, Kangar in Perlis. Her study aims to establish an improved technique in visualising images of vertebrae (C1) Cervical 1 till (C7) Cervical 7 in lateral position. **Obtaining a perfect lateral cervical radiograph is always limited by patients' shoulders that obscure the cervical vertebrae especially C5 to C7.** Large sized patients also required increased exposure factors. Patients with shorter neck lengths also pose a problem. The existing techniques like centering on C4 and Swimmer's view for this anatomical region are currently not producing the desired effect and patients are then instead referred for Computed Tomography.

Therefore a 6 month study was initiated to collect sufficient data to warrant a change in technique. However only radiographs with patients in lateral erect position were considered. Radiographs which were excluded were those that had patients in supine positions, mobile exposures done in wards, post-mortem exposures on deceased persons and radiographs of patients with upper extremity injuries.

The staff did comparisons in the currently employed techniques and the newly recommended technique. Presently the technique used is centering at C4 and the recommended technique is to increase the centering point to EAM (External Auditory Meatus). Another consideration was the patient's position, currently patients stood or sat erect according to the patients physical capability, therefore the recommended technique is to have the patient in a sitting position and coax the patient to be as relaxed as possible and then to get the patient to grasp the lower rung of the chair they are seated on.

Other participants raised their misgivings and thoughts for improvements which should be undertaken by the radiographers at Kangar Hospital. However Ms Rushelawati showed lots of confidence which is very credible. This should spur other younger or junior radiographers to step forward and be presenters at our local meetings and slowly progress to international levels.

Paper 8 – Approaching Problems with Curiosity and Open Mindedness

According to **Ms. Subashini**, a final year student from **MAHSA College**, **problems are merely obstacles in the way of our goals but we must be motivated enough by these problems to search for a solution.**

She went on to tell us that the way we approach problems will define the end results. She gave us many examples of wrong approaches to problems. One that was notable was making assumptions that no one can help us anyway as our problems can never have a solution and by that we agree to limitations others impose on us.

Then we learnt the right approaches towards problems. According to Ms. Subashini problems are there to give us an opportunity to make things great and sometimes even if we don't find a solution others can learn from our experiences.

We also picked up some tips to solving problems that day like identifying the problems by asking questions related to it and by trying "Problem Reversal" that is try to prove that the problem CAN'T be solved as the more loop holes you find, the harder you will drive at a problem.

Ms Subashini gave many fantastic examples that are just too many to list here. We will certainly get her to publish her article in the upcoming newsletters.

In total it was a very comprehensive presentation from a student that merited special mention and it had very practical applications for radiographers.

Paper 9 – Dose Saving with Dual Source Computed Tomography (CT)

Mr. Muhd Zaidi Ab. Rahman is a Senior Cardiac Angiographer at the National Heart Institute (NHI) Kuala Lumpur with 8 years working experience.

He has been a speaker in Cardiac Angiography and Nuclear Cardiology in many institutions such as College of Radiography Kementerian Kesihatan Malaysia, University Kebangsaan Malaysia and International Islamic University Malaysia. He has also been an active participant for the e-Cypher Registry and a coordinator from NHI for international trials for diabetics (DECODE trial).

With such an impressive bio-data Mr Muhd Zaidi was much encouraged to present a paper on methods to reduce radiation doses to patients undergoing Coronary CTA. Coronary CTA is one of the most recent procedures developed to asses the coronary artery disease.

However the radiation dose of this procedure is a great concern among physicians. His presentation highlighted some factors affecting radiation doses in Coronary CTA which include the beam energy, tube current–time product, pitch, patient size and other dose reduction options.

But the main question is how we can utilize these factors to reduce radiation dose yet without compromising the image quality? Based on a one year Coronary CTA experience and current practices/ protocols evaluation, radiographers at IJN were are able to achieve optimum reduction in the Coronary CTA radiation dose. Mr. Muhd Zaidi has agreed to submit his full study in our next newsletter publication for our further reading.

That ended the scientific session and we took another break to freshen ourselves and mentally digest all the information before continuing the afternoon with a panel discussion forum.

Panel Discussion

This forum was incorporated to give participants an avenue to air their views and suggestions to improve the standard of professionalism for radiographers. There were 5 panel members on 5 different topics of discussion. The chairperson for the forum was DR. Mohd Hanafi Ali.

The 5 topics were handled by **Madam Chan Lai Kuan from the College of Radiographers Sg. Buloh for Continuing Personnel Development, I from the National Cancer Society of Malaysia for Standards of Practice and Code of Ethics. Mr. Subramaniam from Radiography College UMMC for Undergraduate and postgraduate education, Tn Hj Mahfuz Mohd Yusop for Leadership and Clinical Management and Tn Hj Mohd Zin Yusof, Chief Radiographer of HKL for Membership registration and Certificate for Practice.**

Madam Chan began by encouraging radiographers to actively pursue their CME and CPD for extra retention of data and collection of new information, she also explained the subtle differences between the 2 programmes and why we needed a balance of both.

When it was my turn I stressed the importance of protecting patients' rights in matters not only connected with radiation protection but also confidentiality, care without prejudice and improving the soft skills of the job.

Mr. Subramaniam recommended all radiographers to pursue further studies as one day the diploma radiographer would be phased out and those not upgraded would have limited opportunities. However he reminded us that we must not equate a degree with higher benefits. The pathway for radiographers is as far as a Masters in Medical Radiation Science. He accurately said that the greatest challenge to human resource is investment.

Tn Hj Mahfuz gave different examples of how radiographers can incorporate the finer aspects of professionalism through their behaviour and attitude. Leaders need to set standards that can be emulated. You are a leader in many areas and not only if you are given a specific title of leader.

Tn Hj Zin stated that at current time there was no bill that forces us to be registered. However there is external pressure from WHO (World Health Organisation) to remove certain sanctions if this is not complied. In 2010 there will be a free trade of human resource, where radiography professionals can travels across a borderless world. However what will the position of Malaysian radiographers be then? So this is encouragement for us to do

something about it now!

As a result of the topics highlighted **En Khalid Osman a U42 Radiographer from Diagnostic Imaging Hospital Universiti Sains Malaysia in Kubang Kerian, Kelantan** gave some thought provoking ideas. He urged the MSR to take over the training of radiation workers to set certain standards to overcome the scenario that exists where the General Practitioner sets up a clinic and employs an X-Ray Operator rather than a qualified radiographer due to higher salary demands. Furthermore some private hospitals are also employing graduates with Radiation Science degrees as Radiation Protection Officers and radiographers too. Many radiographers feel their job opportunities are being grabbed at all angles. He also commented about exploring a 360 degree leadership pattern in our departments as is currently being practiced in HUSM.

Then En Anis Rapaee from Bintulu came forth with some innovative suggestions. En Anis is a former radiographer turned entrepreneur. He suggested the MSR set up a permanent task force to deal with current issues, set a vision and carry out the mission of the members. The MSR should select the capable to lead this evolution.

The forum was getting very interactive with many other remarks and suggestions but had to be brought to a quick close as the guests of honour had arrived.

Official Opening Ceremony

At 4.50p.m we ended the forum and welcomed the arrival of our guests, **Dr. Nooraini Baba the Pengarah Kesihatan Melaka and Dr. Siti Fatimah, the Chief Radiologist of Jabatan Pengimejan Hospital Melaka.**

Our President Tn Hj Zin gave his opening speech and spoke about the number of mushrooming colleges in Malaysia that resulted in many students flooding the departments but faced a lack of supervisors and shortage of tutors.

He urged all radiographers in the clinical setting to help train the students so as not to produce half-baked radiographers that would be a liability to the department they eventually worked for.

Early education is very important so we must teach them right early. At the same time we will renew and refresh our techniques and practices. We must be good examples for the students to follow and accept the graduate radiographers because they have been accepted by JPA.

Tn Hj Zin announced that the **ACRT** will be held in Malaysia in from the **13th to 16th of August 2009**. It would be attended by radiographers from around the Asian region. Cost of registration would be around RM700- RM750 and looked forward to many radiographers attending from the private and public sector.

He further thanked all the vendors and sponsors support that enabled so many radiographers to come together in Melaka. He also thanked the MSR EXCO for the dedication and effort.

Dr Nooraini Baba started her speech by commenting on the large turnout of radiographers. She commended the choice of theme "Innovation is Care" as it was appropriate with the number of challenges we currently face. We have to move on with the times, look at our procedures and define its relevance and suitability. If you do not review your procedures you cannot improve your image and quality.

Everyday is innovation day according to Dr Nooraini so we mustn't wait for a competition to come up with innovative ideas. Instead we must develop lateral thinking processes to learn from all sectors and reform areas that are outdated. She advised us to adopt and adapt because technological advances forces us to learn and relearn and congratulated the MSR for organising 7 study days last year.

She further urged us not to be complacent with what we have and take the opportunities to present papers and get know our counterparts during the upcoming ACRT.

In closing she hoped that the members would greatly benefit from this gathering especially the inter-mingling of the senior and junior radiographers.

Banquet Dinner

These topics conversation carried on into dinner for many of the participants as it was truly "food for thought" for us to think of ways to consolidate our efforts and achieve more for the profession.

Dinner was held at the **Kayangan Ballroom** with its majestic high ceiling chandeliers and plush red carpets. We had a huge spread of food at the buffet table and it was such a perfect setting to mingle and renew ties.

Pn Habibah Ahmad was Emcee and engaged the assistance of Staff from PTj Biomedical Imaging from PPUM (Pusat Perubatan Universiti Malaya) who prepared some interesting dinner games. I felt transported back to school days with the simple yet fun filled games.

Many thanks to Syarul Hafix, Ahmad Faiz, Nor Azurah and Zaharah for coming up with the ideas and keeping us entertained.

We also had lucky draw prizes graciously **sponsored by IDS Marketing.** The radiographers from Sandakan were very lucky that night and many took home large packages.

Pn Hjh Noor Khairi, our Treasurer, Mr Packya Dassan the Honourable Secretary and Vice President Madam Chan Lai Khuan were presented with a commemorative plaque as appreciation for their dedication and tireless service to the Society.

Comments and feedback

The AGM should have started on time and the checkout time should have been negotiated for an extension. But on the whole- SYABAS!

Patsy Hue

I think there were no shortcomings in the recent 38th SM & AGM 2008, and even there were, there were trivial, insignificant and not worth mentioning. Keep up the good work. ***Edward Lojikim***

Next AGM will be in Johor Bahru in March 2009.

View the photos at this link
http://ph.groups.yahoo.com/group/ms_radiographers/photos/browse/ef57

Computed Tomography Laser Mammography (CTLM)

Computed Tomography Laser Mammography (CTLM®) is the trademark of Imaging Diagnostic Systems, Inc. (IDSI, USA) for its optical tomographic technique for female breast imaging.

This medical imaging technique uses laser energy in the near infrared region of the spectra, to detect angiogenesis in the breast tissue. It is optical molecular imaging for both oxygenated and deoxygenated hemoglobin. The technology uses laser in the same way computed tomography uses X-Rays; these beams travel through tissue and suffer attenuation.

A laser detector measures the intensity drop and the data is collected as the laser detector moves across the breast creating a tomography image. CTLM images show hemoglobin distribution in a tissue and can detect areas of angiogenesis surrounding malignant tumors.

CTLM looks at the blood flow to the breast so since newly forming tumors have increased blood flow; CTLM may be the answer to finding very small tumors which can be hidden in routine mammography. Additionally, dense breast tissue is easily penetrated with the laser while traditional mammography has difficulty with dense breast.

CTLM® Frequently Asked Questions (FAQs)

Q: What is CT Laser Mammography?
A: A CT-like scanner, but its energy source for imaging is a laser diode beam in place of ionizing radiation such as is found in conventional x-ray mammography or CT scanners.

Q: How Is A Patient Examined?
A: A patient lies face down on the scanning table with one breast hanging into a specially designed scanning chamber. The laser beam sweeps 360 degrees around the breast starting from the chest wall moving forward until the entire breast is scanned. The data is acquired by a patented array of specialized detectors, where it is reconstructed by computed algorithms to create three-dimensional cross sectional images of the breast. The examination takes approximately 15 minutes to perform and requires no breast compression.

Q: Can The CTLM Be Used In Place Of A Screening Mammogram?
A: Not currently, the CTLM® is being positioned as an adjunct to mammography.

Q: Is There Any Special Requirement Necessary Prior To A CTLM® Exam?
A: No, an examination can be performed during anytime of the month or day and does not require special preparation of any kind.

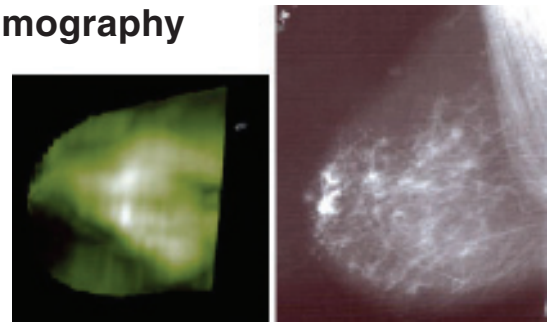
Q: How Long Will It Take For My Results?
A: The CTLM® reconstructs the image while the scanning is in process.

Q: Can A Patient Be Examined By The CTLM® Regularly?
A: Yes, since it does not expose the patient to ionizing radiation a person can be scanned as often as needed.

Q: Where can I get a CTLM®?
A: The CTLM® is not yet approved in the in the United States, but is available internationally. The Food and Drug Administration process is pending.

Imaging Diagnostic Systems (IDSI) of Plantation, FL, has shipped its CT Laser Mammography (CTLM) system to the Universiti Putra Malaysia (UPM) in Kuala Lumpur, Malaysia. The CTLM system will be installed at UPM's academic facility and evaluated by UPM in conjunction with specialists from Serdang Hospital in Kuala Lumpur. The CTLM system is expected to be in service by October 1 2007.

Comparison of CTLM and Conventional Mammography



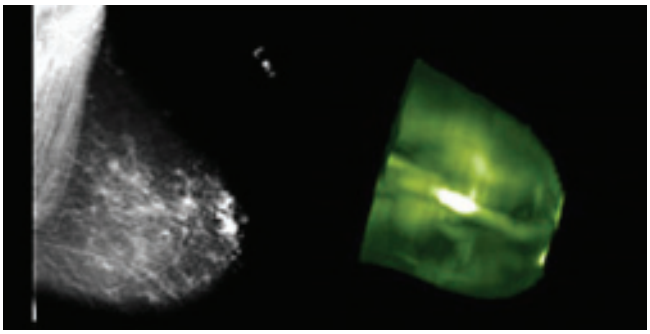
IMAGES: IMAGING DIAGNOSTIC SYSTEMS, INC.

A large area of suspicious new blood-vessel growth supporting a cancer tumor is clear in an image made with computed tomography laser mammography (left). In the mammogram (right), the possibly cancerous micro-calcifications ("grains of salt") appear in a smaller, less obvious area.

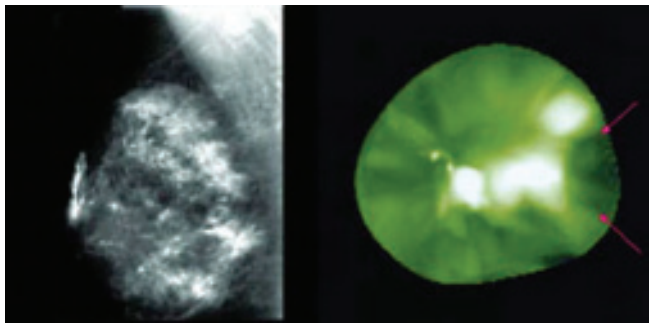
Facts About CTLM® And Optical Imaging

- CTLM® is part of the emerging field of optical imaging.
- CTLM® images blood flow to the breast and thereby should visualize Tumor Angiogenesis.
- CTLM® does not use ionizing radiation (no x-rays).
- CTLM® images through implants and dense breast tissue easily, unlike mammography which has difficulty penetrating very dense tissue.
- There is NO breast compression with CTLM® and the breast hangs in the machine opening in it's natural position.
- In a study of over 100 women, including 30 with breast cancer, optical imaging increased sensitivity and specificity of breast cancer detection by more than 90% (Britton Chance, Molecular Imaging, Vol. 2 #2)
- The average scan time is about 10-15 minutes per breast.
- CTLM® may provide a brighter future for cancer patients due to earlier diagnosis and treatment. Early visualization of tumors in the evolving process will lead to breast sparing surgery and reduced trauma to the patient.

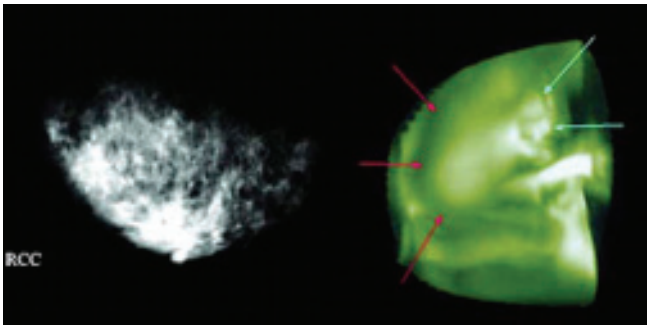
Clinical - Case Studies



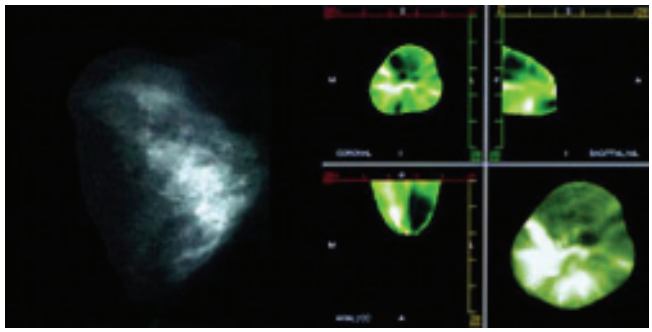
Case Study: #1
Pathology: Micro-calcification



Case Study: #2
Pathology: Sub-areolar vascularity

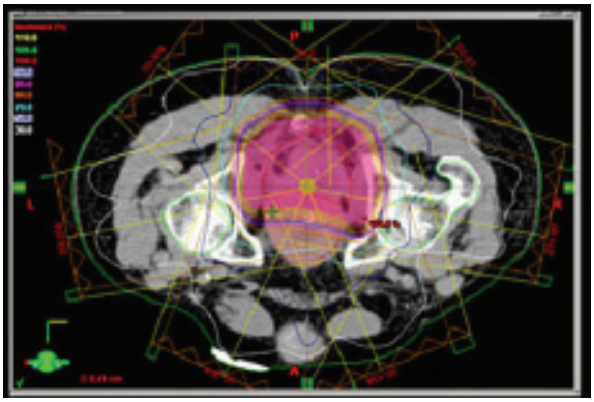


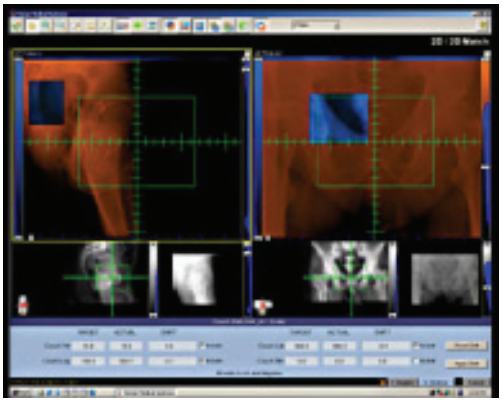
Case Study: #3
Pathology: Infiltrating ductal carcinoma grade III of IIi



Case Study: #4
Pathology: Benign calcification

Basics of IMRT and IGRT





Intensity Modulated Radiation Therapy (IMRT) uses advanced computer technology to deliver highly focused radiation to tumors. This precision allows critical structures surrounding the tumor such as nerves, intestines and bladder to receive a minimal amount of radiation. This combination allows doctors to deliver higher radiation doses to the tumor with minimal side effects.

IMRT involves treating tumors from multiple directions around the body using a multi-leaf collimator. The multi-leaf collimator allows the radiation beam to be divided in multiple small treatment fields thus allowing the dose to be delivered to the tumor while the fields are open and no radiation when the fields are closed. Often closed and open fields are next to each other, allowing critical structures to receive only a small amount of radiation.

IMRT is used to treat tumors of the prostate, head and neck, pancreas, sarcomas and gynecologic tumors. Localized prostate cancer can safely receive high doses of radiation up to 86Gy with minimal toxicity and improved tumor control. Highly focused radiation can be delivered to pancreatic and gynecological tumors while significantly decreasing the radiation dose to the small intestines, rectum, bladder and bone marrow.

Current issues in IMRT

1. Gross Tumor Volume and Planning Tumor Volume definitions
2. Anatomy of prostate, head and neck, breast, Cranial Nervous System, abdominal, and pelvic tumors
3. Normal tissue definition and dose constraints
4. Treatment planning and target definitions
5. PET/CT fusion, dose escalation strategies with MRI Spect

IMRT Clinical Equipment Requirements

1. Linear accelerators with dynamic multi-leaf collimators
2. Commissioned inverse treatment planning system and validated beam data
3. Varis treatment record and verification system and the amorphous silicon portal imager
4. Rit software and film or ion chamber dosimetry

IGRT (Image guided radiation therapy) is an advanced technology that allows radiation to be delivered to tumors with more precision than was traditionally possible. One of the challenges encountered when radiation is delivered to a tumor is that the tumor can move based on the patient's day to day position on the treatment table, as well as secondary to breathing. IGRT uses advanced imaging technology with on-board imaging (OBI). This OBI uses kilovoltage quality imaging that allows the radiation oncologist to visualise a patient's anatomy such as pelvic bones, with each radiation treatment. This added accuracy allows radiation to be delivered to a tumor based on its location in the body at the precise moment of treatment. In addition, the KV imaging can generate daily CT scans (cone beam CT's) that determine not only the precise position of the tumor but the position of normal tissues that are close to the tumor, such as intestines, nerves, and kidney.

Current issues in IGRT

1. Inter- and intra-fraction motion management and immobilization
2. The role of IGRT in treating primary tumors and metastasis with an emphasis on inter-fraction and intra-fraction concerns and data, use of on-board imaging with illustrations of KV-KV matching, graphic illustrations of OBI shifts in treated patients, radiographic responses in clinical cases, use of gating for small bowel motion, extra-cranial radiosurgery concepts and data, Trilogy and 4-D gating in body radiosurgery, and a review of the Emory dose escalation protocol
3. Review data that support the use of cone beam CT
4. Patient quality assurance for immobilization, gating, and on-board imaging systems.

IGRT Clinical Equipment Requirements

- Linear accelerator with OBI capabilities
- 4-D simulation hardware and software
- RPM gating system
- Body and/or brain immobilization capability
- 3-D treatment planning computer with the ability to generate Digitally Reconstructed Radiographs (DRR), and a record and verify system capable of DRR transfer (Varis)

VISICOIL™

With the VISICOIL marker what you see is what you treat! The clinical success of focused, dose-delivery procedures such as intensity modulated radiation therapy (IMRT) and conformal radiation therapy (CRT) is based on the accuracy of target identification and precise patient positioning.

VISICOIL markers allow for accurate tumor localization, using a variety of visualization techniques, and help these focal radiotherapy procedures provide the following:

- Higher doses to the tumor and periphery
- Accurate daily patient positioning
- Dose escalation in a given session
- Real-time targeting of tumors and tumor beds
- Image-fusion between various visualization modes (CT, MRI, Ultrasound)
- On-line treatment planning procedures/protocols

VISICOIL is a general-purpose implanted fiducial marker. The marker is indicated for use to radiographically mark soft tissue for future therapeutic procedures, per the US FDA approved 510(K).

Currently, the device has been developed for use in marking the prostate and peri-prostatic tissue. Other potential organs that may benefit from VISICOIL include: Liver, Breast, Cervix, Lungs, Tongue and Esophagus

By design, the VISICOIL TM markers are made to facilitate:

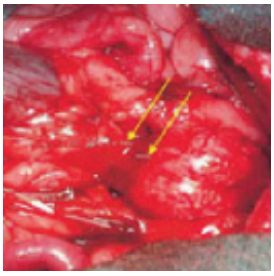
- Patient positioning in focused field radiation therapies such as intensity modulated radiation therapy (IMRT), conformal radiation therapy (CRT) and proton therapy, etc.
- Defining the boundary of the prostate in brachytherapy, HDR
- Image fusion between MRI and CT or CT and ultrasound

Visibility / Imagability

VISICOIL linear fiducial markers are naturally visible by ultrasound, x-Ray, CT, MRI, and high-energy photons (portal images), allowing the physicians to implant the markers under one mode and later visualize them by another technique for treatment planning.

Flexibility

The coiled-wire design of VISICOIL provides extreme flexibility of the marker and allows the marker to conform with highly mobile soft tissue.

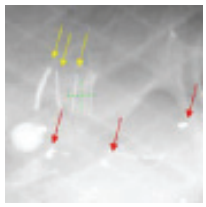


Stability in Soft Tissue

The extended and coiled-wire structure of the VISICOIL TM provides for stability of the marker in tissue. The marker is designed to minimise migration and movement i.e. to stay where you implant it.

Extended Length

The extended length of the VISICOIL marker allows the eye to track the marker image in soft tissue. As has been demonstrated in anatomical phantoms, VISICOIL can be more easily recognized than the much larger point markers and with less confusion.



Volume Visualization

Three points, when correctly visualized, define a plane. Two or more VISICOIL markers can provide volume information.

Thin Profile

These markers can be inserted by a fine needle, from 22- to 18-gauge, resulting in a less traumatic procedure to the patient.

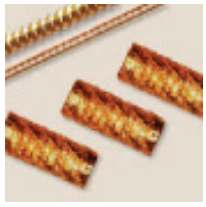
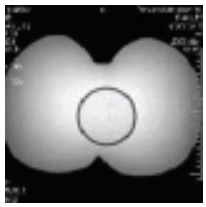


Image Fusion

VISICOIL TM markers are visible using various imaging modalities. Thus, the position of the marker or markers can be used for image fusion when using different modes (e.g. MRI-CT, US-CT, etc.).

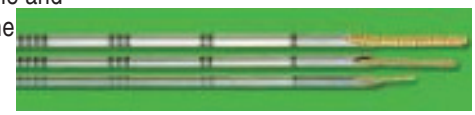


Delivery System

The VISICOIL TM delivery system is a simple design made to introduce (drop) the marker into the lumen of the appropriate needle.

Sterility

The VISICOIL TM markers are delivered sterile and ready for use in the OR



In addition to the VISICOIL general-purpose implanted fiducial marker, IBA Dosimetry offers pre-loaded VISICOIL markers, sterile and ready to use!

Recommended Visualization Techniques

	0.35 mm	0.75 mm	1.10 mm
CT-Fluro-TRUS-MRI	■	■	■
Trans-Abdominal Ultrasound		■	■
EPID-Portal		■	■
KV, OBI	■	■	
MV		■	■

Note:
1.10 mm is only available in 1-3 cm and provided loose or preloaded.

ROLE OF IGRT IN FRACTIONATED RADIOTHERAPY AT 2 GY PER FRACTION

Enthusiasm for real-time image guidance in radiotherapy (IGRT) is partly due to the commercial availability of advanced on-line imaging technologies and because IGRT has the potential to improve conventional radiotherapy and also facilitate hypo-fractionated or single-dose treatment.

During the last decade technological advances in radiation therapy have been very rapid. It began with three-dimensional conformal radiation therapy (3DCRT) then progressed to intensity-modulated radiotherapy (IMRT) and now we have image-guided radiotherapy (IGRT).

***Even though technology can drive innovation, it must be carefully evaluated, and then applied thoughtfully and appropriately**. After all, the development of radiotherapy was in part technology driven—the discovery of X-ray by Roentgen and radium by Curie.*

So what are the potentially useful features of IGRT?

An ideal IGRT system should have three essential elements:

1. 3Dimensional (3D) volumetrics of soft tissues including tumors
2. Efficient acquisition and comparison of the 3D volumetrics
3. An efficacious process for **clinically meaningful intervention**

Clearly, 'clinically meaningful intervention' is the most important goal of IGRT. In contrast to this simple definition and well-defined goal, many other aspects of IGRT are anything but simple or clear, and there is much uncertainty and debate regarding many topics, e.g.

- 2Dimensional (2D) vs. 3Dimensional (3D)
- kilovoltage vs. megavoltage
- the use of markers
- minimising the effect of respiration on treatment uncertainties.

So then for the patients' benefit it is prudent to take stock of the clinical issues, and then match the technology to them.

Proponents of IGRT argue that IGRT can reduce set-up error and account for organ motion, and therefore will improve treatment outcome. However the true question is what the real benefit is, balanced against cost.

Cost is the easier one to calculate as it dictates how quickly IGRT becomes popular. However we must leave aside the issue of strict economics because the more relevant question for this discussion is the quantification of benefit or in others words the treatment outcome.

Outcome assessment will require clinical trials and data collection will take considerable time to collect. At present time we are left with the issues of reduction of set-up uncertainties and minimisation of the effect of organ motion which we will use to quantify treatment outcome improvement.

There are two types of set-up uncertainties:

1. systematic
2. random

Systematic error exists because the 3D image acquired during CT simulation is only a single still image, and the target position determined at that instant of time may differ from the average target position.

Random error is the day-to-day deviation from the average target position. Systematic uncertainty is more crucial, because if uncorrected it would be used throughout the treatment course, and lead to serious effects on local control.

Assuming that 3D images of tumor/soft tissues can be acquired efficiently how can they be used for meaningful intervention? A simple solution would be to make corrections based on the comparison between the daily 3D images and the reference 3D volumetrics that were obtained at CT simulation. If that could be accomplished based on tumor/soft tissue in real time or near real time, both systematic and random errors would be corrected on a daily basis.

Doing that for each of the many treatment sessions in conventional fractionated radiotherapy would be costly in terms of resources, possibly unnecessary, and therefore wasteful.

This is because there is general agreement that 3–5 imaging sessions would be sufficient for the correction of systematic error, with subsequent periodic (e.g. weekly) checks for additional assurance. As to random error, its detrimental effect is usually smaller, and in any event is already accounted for in the delineation of the Planning Tumour Volume (PTV). As will be discussed later, the current definition of PTV may be altered with the ability to correct for random errors.

Regardless of the periodicity of the intervention, the simple solution outlined above ignores the complexities in the comparison of 3D volumetrics of tumors and normal tissues, and in implementing meaningful intervention.

With questions such as:

1. ***What are the metrics for the comparison?***
2. ***Do we use the center of mass of the target, or its boundary?***
3. ***How would we deal with changes in the tumor shape, which might occur on a day-to-day basis?***
4. ***What about the border between the target and critical adjacent tissue, and how do we decide on the trade-off between target coverage and avoidance of organ-at-risk?***
5. ***Who is going to perform the comparison, make the decision as to whether to correct, and then implement the intervention in real time or near real time?***

These are complex questions, and whatever answers are offered, they need to be validated. An alternative is to perform the comparison and correction off-line, but that would diminish the advantage of an on-line system, and in allowing more time, the process will also require more time.

Another factor for consideration is the imaging radiation dose, but it will not be discussed in this article.

Tumor changes can be easily noted using CT simulator during the treatment course, followed by a new treatment plan if warranted. This option, while technically available in most departments, is rarely used to make mid-course corrections to the treatment plan.

CT-based imaging techniques which provide volumetric data are clearly the most powerful for IGRT applications. Conventional CT has been incorporated into treatment rooms but it will eventually give way to devices that can be directly incorporated into the treatment units. In terms of soft tissue image quality, conventional CT is the best, followed by kilovolt cone-beam CT and megavolt CBCT. The ranking of helical megavoltage CT is as yet unknown, but probably neither the best nor the worst.

However, how the theoretical advantages (e.g. 3D vs. 2D, kilovoltage vs. megavoltage, and soft-tissue vs. bony anatomy or fiduciary markers) translate into improved clinical results remains to be demonstrated. The complexity of IGRT is compounded at sites that experience motion—most commonly due to respiration. Yet respiratory control and IGRT are distinct processes and one does not imply the other.

Eventually, the tools of IGRT may provide approaches to better monitor and/or facilitate respiration controlled treatment. Certainly uncontrolled motion produces artifacts, which degrade the quality of volumetric imaging methods. At present, the coupling of IGRT with respiration control is even more experimental than the separate component techniques, and the many complexities cannot be adequately discussed here.

Thus far we have emphasized the many questions concerning the IGRT process and the difficulties in quantifying its clinical benefit. These discussions are in the context of conventional fractionated radiotherapy of multiple 2 Gy fractions, using the current practice of target definition. We recognize the potentials of IGRT and believe that they will eventually be realized through carefully designed studies, but that these will take some time to complete. As the capabilities of IGRT improve, it will provide the tools to better understand treatment uncertainties and allow a reexamination of the present practice regarding the expansion of GTV into the CTV, ITV and PTV, the limitations of which are well known. We are uncertain about the tumor extension from what is visible radiologically, so we enlarge GTV to CTV. To account for organ motion, we further enlarge CTV to ITV and to account for set-up error, we cover the ITV with the PTV. Given such practice, it simply makes no sense to use IGRT to assure that the PTV is within the each radiation field, each and every day during a course of conventional fractionated radiotherapy.

What is of potential, after validating its capabilities, is that IGRT will allow us to refine our definition of the target volume.

It is suggested that the concept of image-guided target volume (IGTV or PTVIG), which is CTV plus a margin to account for residual set-up uncertainty and organ motion when 'image-guidance' is used during radiation delivery. It is most likely that IGTV is smaller than the corresponding PTV, which would translate to reduced dose to normal tissues, allowing dose escalation and improving local control.

Viewed in this perspective, IGRT is a continuation of the progress we experienced with 3DCRT and IMRT, processes that permit increased tumor dose while keeping normal tissue toxicity at bay.

As was performed for 3DCRT and IMRT, clinical trials would be needed to validate this hypothesis. The above is predicated upon the absence of disease outside the delineated CTV. Improved imaging techniques is needed to validate this assumption, and in the future, to provide pertinent biological and physiological information (e.g. tumor cell density and hypoxia) for real-time feedback and control of dose distribution using IGRT.

Perhaps even more interesting, and certainly more provocative, once we can combine IGRT and IMRT efficaciously, is to re-visit the concept and practice of fractionated radiotherapy at 2 Gy per fraction. In the pioneering development of radiotherapy in the early 20th century, fractionation was devised to exploit the differential repair capabilities of normal tissues and tumors, so that curative doses could be delivered.

Until approximately 10 years ago, radiotherapy required irradiation of significant volumes of normal tissues to high doses. With 3DCRT and IMRT that reduce normal tissue irradiation, and now IGRT for possible further reduction, is there an opportunity to examine whether fractionated radiotherapy at 2 Gy per fraction is still the optimum strategy?

The 4 Rs of radiobiology would suggest that some fractionation is beneficial, but how much fractionation is needed to retain that benefit? The lower alpha/beta ratio of dose-limiting late-effect normal tissue relative to that of tumor would also argue against hypo-fractionation, but the reduction in irradiated normal tissue due to IMRT and IGRT might provide a more forgiving scenario.

Attempts to predict iso-effective doses for extreme hypo-fractionation venture into almost uncharted territory. In a theoretical study of hypofractionation in lung it was found necessary to assume a 10–20% hypoxic fraction with an OER of 2.5–3, or other very resistant cells, to reach agreement between BED values calculated by LQ models and clinical results of 3–5 fractions exceeding 12 Gy/fraction. In this context, recent studies in experimental models have suggested that the mechanism of tumor response for single high-dose radiotherapy may differ from that for fractionated radiotherapy.

In fact, the practice of single dose radiotherapy has achieved some degree of success, suggesting that fractionation may be unnecessary in specific clinical situations. It is therefore not a coincidence that a number of institutions and cooperative trials are studying the use of hypo-fractionated and single dose radiotherapy. In those settings IGRT would obviously be extremely useful and perhaps even mandatory.

In summary, for conventional fractionated radiotherapy much study is needed to evaluate how to apply the various approaches of IGRT appropriately and efficaciously. More importantly, the combination of IMRT and IGRT may provide the tools for examining as to whether it would be equally or more effective to hypo-fractionate or even perform single fraction radiotherapy. If these approaches prove successful they could lead to a major revolution in radiation and cancer therapy.

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ANNOUNCEMENTS

1. View the photos from the Melaka AGM 2008 at http://ph.groups.yahoo.com/group/ms_radiographers/photos/browse/ef57

2. **WEBSITE –** The Malaysian Society of Radiographers is proud to announce our website www.msradiographer.org. You may visit the site to download newsletters, forms and view upcoming events.

3. New Education Chairperson – Ms Gina Gallyot – appointed after unanimous decision of members at AGM to allow EXCO to nominate and appoint.

4. Malaysia will host the 17th ACRT in 2009, view the first announcement online at http://groups.yahoo.com/group/ms_radiographers/files/%28%20NEW%20%29%20ACRT%20MALAYSIA%202009/

5. Support the MSR by registering your membership, forms available online at http://groups.yahoo.com/group/ms_radiographers/files/MSR/

UPCOMING EVENTS

1. MSR MRI SEMINAR – 18th-20th July

2. 1st NUH ARC Course Programme – 12-13th July 2008 – Singapore – National University Hospital

3. 23rd Singapore Malaysia Radiographers Conference – SINGAPORE – 6-7th September 2008. Go to the Singapore Society of Radiographers website for further information at http://www.ssr.org.sg/