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Message from President

Salam Sejahtera

I am glad and honoured for being elected as the new president of The Malaysian Society of Radiographers for the term 2007 – 2009. The trust that has been given to me by the members is a new challenge to my career as a radiographer.

Congratulations to the newly elected EXCO members with whom I am going to work with for the next two years. The new EXCO has few big plans in the pipeline. As you can see they are not new faces, some were from the last term and the rest had some experience as a committee member before. These are dedicated members who are willing to sacrifice their time and energy to ensure the society is functioning effectively. Our new team is made up of members with clinical and teaching back ground. At the same time, we have public and private representatives too. With this strength, I personally hope the team would be able to perform as expected by all members. As a leader, I need support and cooperation from my council members and all members. New ideas, innovations and positive criticisms are welcome.

X-rays have existed in Malaysia for more than eleven decades since it was discovered by Roentgen in 1895. Radiographers have been seen by the public as the main players as far as x-ray medical usage is concerned. As professionals, we must be seen and project ourselves as professionals in our actions and deeds. We should conduct ourselves with dignity and pride in our specialty and only then will we earn respect and due recognition from people to trust us and our capabilities.

A lot has been done to improve the status of radiographers in Malaysia BUT don't forget other professions are improving too and at a faster rate. We have to do our own reflective study to evaluate how much we have done so we can further improve ourselves. We are yet to see the graduate radiographers joining the public hospitals. I personally hope injection of this new blood will change the image of radiographers. Local institutions of higher learning have opened up their doors providing us the opportunity to upgrade our qualification. What is needed from us then is sacrifice and commitment.

At our last AGM, Mr. Robert George, President of ISSRT in his keynote address stated that the future of radiography is very bright. I personally hope that we radiographers in Malaysia will benefit from this prospect. We must be willing to learn, relearn and unlearn to keep up with progress and development. The society will try its level best to bring in the latest updates on technology through our newsletters, seminars and workshops. The EXCO members can't work or walk alone; members are needed to come up with ideas, proposals, suggestions and positive criticisms.

I wish all of you only the very the best in your daily undertakings.

Mohd Zin Yusof
President
The Malaysian Society of Radiographers



MSR EXECUTIVE COUNCIL 2007-2009



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“The task of a leader is to get his people from where they are to where they have not been.”
~ Henry Kissinger (1923 -)

New appointments
Appointment effective as of 1st June 2007

Ms Chan Lai Kuan
Head of Programme
Radiography and Radiotherapy Programme
Kolej Sungai Buloh

Mr Zulkifli Mohamed Amin
Head of Programme
Medical Imaging Program
UiTM

Daud Ismail
Ketua Juru X-Ray
Jabatan Pengimejan Diagnostik
Hospital Selayang
Conferred Pingat Pekerti Terpilih (PPT)
by DYMM Sultan Selangor on the occasion of His
Majesty's birthday
17 May, 2007

MSR JULY STUDY DAY (1)

Topic : Update on PET CT

Date : 07 July 2007

Venue : CITITEL EXPRESS – KUALA LUMPUR

449, Jalan Tuanku Abdul Rahman,
50100 Kuala Lumpur, Malaysia.
Tel: +603 26919833. Fax: +603 26913103
Reservation: resvnlul@cititelexpress.com
Enquiries: infokul@cititelexpress.com
<http://www.cititelexpress.com/KL/index.html>

Time : 0900 to 1700 hrs

Tentative Programme

1. Introduction to Molecular / Functional Imaging
2. PET (instrumentation) – PET Scanner, Cyclotron
3. Radiopharmaceutical for PET Imaging
4. Radiation Protection in PET Imaging
5. PET Clinical Radiology
6. PET Clinical Radiotherapy
7. Q & A Session

COMMENTS AND FEEDBACK
FOR THE NEWSLETTER

We hope that you find this newsletter helpful and would appreciate member's comments and feedback so we may be able to improve and serve you better.

You may contact us through post at:

The Editor
Malaysian Society of Radiographers
c/o Department of Radiotherapy and
Oncology Kuala Lumpur Hospital
Jalan Pahang 50586

Or through email to
(Tn Hj Mahfuz Mohd Yusop)
mymahfuz@hotmail.com

Please include your full name and contact number (and a pseudonym if you wish to remain anonymous).

Those wishing to advertise in this newsletter on events, vacancies or other happenings relevant to the profession may also write in to the editor.

The Malaysian Society of Radiographers manages a yahoo group site online. Members who wish to join this group are requested to visit your group on the web at:
http://groups.yahoo.com/group/ms_radiographers/

You will have to register and sign in as a member to activate links to this site. Once you have logged on you will find easy access to other members and also be able to view instant information sent out to the rest of the group.

Do look out for our new website coming up soon!

SINARAN
EDITORIAL BOARD

EDITOR IN CHARGE
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EDITORIAL COMMITTEE
GINA GALLYOT
M. SRIPRIYA
RAVI CHANTHRIGA

UPCOMING EVENTS

- 1. JUL 2007 UPDATE ON PET CT**
- 2. AUG 2007 22ND SINGAPORE MALAYSIA RADIOGRAPHERS**
- 3. SEP 2007 CONTRAST WEEKEND COURSE**

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From The Secretary's Desk



Packya Narayanan Dassan
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Dear colleagues,
I would normally write a summary of the most recent event organised by the Society but our World President Mr. Robert George has done such a brilliant summary that I

decided I would like to share some things which have a source of information and also inspiration for us involved not only in the care of patients but in the world of science and technology.

The Scientific Meeting focused on Bridging Technology and Practice so we too have to make a suitable adjustment in our mentality to accommodate new inventions but never forgetting the humble beginnings of some very significant inventions and people.

The invention of WD-40 – an event that changed the course of life



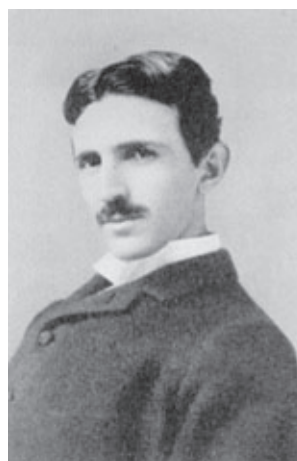
In 1953, a fledgling business called Rocket Chemical Company and its staff of 3 set out to create a line of rust-prevention solvents and degreasers for use in the aerospace industry. It took them 40 attempts to perfect their formula. The original secret formula for WD-40 which stands for Water Displacement, 40th attempt is still in use today.

What a story of persistence!

It was first used by Convair to protect the outer skin of the Atlas missile from rust and corrosion and today it is used around the home for things such as stopping squeaks in door hinges and generally freeing up simple mechanical items found around the house, such as door locks.

In the Star Trek parody movie “Galaxy Quest” there is a reference made to WD-40: Fred Kwan (after blowing two of Sarris’ men out the airlock) says, “Sorry, the door was a little sticky. Did you see that? I’ll get one of my boys up here with a can of WD-40.”

The importance here is the persistence of the inventors to keep on going even after many failures. If they had given up imagine the number of stuck locks we would have, the rust in aerospace equipment and most frightening of all someone else might have taken over the research and succeeded!



A famous scientist Nikola Tesla

Nikola Tesla (July 9 July 10, 1856-January 7, 1943) was a physicist, inventor, and electrical engineer of unusual intellectual brilliance and practical achievement. He was of Serb descent and worked

mostly in the United States.

Tesla is most famous for conceiving the rotating magnetic field principle (1882) and then using it to invent the induction motor together with the accompanying alternating current long-distance electrical transmission system (1888). His patents and theoretical work still form the basis for modern alternating current electric power systems.

He also developed numerous other electrical and mechanical devices including the fundamental principles and machinery of wireless technology, including the high frequency alternator, the “AND” logic gate and the Tesla coil, as well as other devices such as the bladeless turbine, the spark plug and numerous other inventions.

In 1884, leaving the warfare of his birthplace behind, Tesla moved to the United States of America to accept a job with the Edison Company in New York City. He arrived in the US with 4 cents to his name, a book of poetry, and a letter of recommendation from Charles Batchelor, his manager in his previous job.

Nikola Tesla worked with time travel technology. Some people believe that his information came

from entities in other realms. Part of the information was supposedly later used by Albert Einstein and others involved with the Philadelphia Experiment and other space/time projects. There is no physical evidence to substantiate any of these claims.

Tesla was a man of vision who saw beyond the realm of third dimension. He was a genius among geniuses who believed in infinite possibilities.

TESLA QUOTES

“Of all the frictional resistances, the one that most retards human movement is ignorance, what Buddha called ‘the greatest evil in the world.’ The friction which results from ignorance can be reduced only by the spread of knowledge and the unification of the heterogeneous elements of humanity. No effort could be better spent.”

“Science is but a perversion of itself unless it has as its ultimate goal the betterment of humanity”

9 TIPS ON RUNNING MORE PRODUCTIVE MEETINGS

1. **Circulate an agenda** - An agenda should show the planned steps that get the meeting from “here” to “there.” It helps the participants prepare appropriately and anticipate the kind of information they might need to produce. Most importantly, it works as a contract with the participants: “here’s why this is a great use of your time for *n* minutes.”
2. **Have a theme** - Meetings shouldn’t be meandering tours of each participant’s frontal lobe (unless — well — unless that’s the actual *agenda*). Make it clear *why* this meeting is happening, why each person is participating at a given time, and then use your agenda to amplify how the theme will be explored or tackled in each section of the meeting.
3. **Set (and honor) times for beginning, ending, and breaks** - There’s nothing worse than a rudderless meeting that everyone knows will just prattle on until its leader gets tired of hearing him self talk. You own your meeting by putting up walls — provide structure and be firm about respecting everyone’s time.
4. **No electronic grazing. Period.** - Laptops closed. Phones off. Blackberries left back in the cube. You’re either at the meeting or you’re not at the meeting, and few things are more distracting or disruptive than the guy who has to check messages every five minutes. Schedule breaks for people to fiddle with their toys, but fearlessly enforce a no grazing rule once the meeting’s back in session. Emergency call to take or make? They have to leave the room. No exceptions. If you’re too busy to be at the meeting *everyone else* has made time for, just leave.
5. **Schedule guests** - Do **not** put thirty people in a room for three hours if twenty of them will have nothing to do for all but the last ten minutes. In your agenda, make it clear when people will be needed and you’ll encourage best use of everyone’s time. It’s also extra incentive (or even an excuse) to tick off agenda items in a timely manner. (“Well, it looks like Henderson is here to share his sales report, so let’s move on.”)
6. **Be a referee and employ a time-keeper** - If you can afford it, have one person in the meeting be the slavish time-keeper so you, as the leader, can focus on facilitating, summarizing, clarifying, and just keeping things *moving*. Working closely with the time-keeper, you should not be afraid to announce things like “Okay, we have three minutes left for this, so let’s wrap up with any questions you have for Alice, then move on.”
7. **Stay on target** - Any item that can be resolved between a couple people offline or that does not require the knowledge, consent, or input of the majority of the group should be scotched immediately. Close rat holes. As soon as the needed permission, notification, or task assignment is completed, just move on to the next item.
8. **Follow up** - If you have been utilizing a project manager or note taker (and you should!), be sure to use a few minutes at the end for him or her to review any major new projects or action items that were generated in the meeting. Have the Secretary email the list of resolved and new action items to all the participants.
9. **Be consistent** - Take any of these tips that work for you — and many certainly may not — but understand one thing above all; meetings do not run themselves, and if you have any desire to make best use of valuable people’s time, you’ll need a firm hand and a lot of thoughtful planning. Set a pattern of being the one whose meetings aren’t a bore and you’ll start seeing the productivity, tone, and participation in your meetings consistently improve.

Radiographer Reporting – A perspective from a Senior Radiographer of Queen’s Medical Centre, Nottingham, University Hospital.



The “Red Dot” system (*please refer to bottom of article for clarification*) has helped radiographers progress from not just taking x-rays but to making an official comment on the appearance of the radiograph.

Radiographers are able to utilise their knowledge in an extended capacity to aid diagnosis of the patient’s condition. Reporting is the next logical step. In the past radiographers were not even allowed to comment on the outcome of the radiograph they had taken so to be allowed to actually produce an official report without a radiologist’s second report is a significant step.

TRAINING

There is a course at Bradford University among other places in the United Kingdom for Radiographic Image Interpretation. This 10 month intensive course encompasses areas of axial and appendicular skeleton and chest and abdomen. The course does not only concentrate on trauma but also on other aspects of plain film pathology: arthritides, bone tumours and musculo-skeletal syndromes. The importance of recognising normal variants such as ossicles and developmental anomalies was also emphasised. Coursework entailed: 4 assignments; 2 exams musculo-skeletal and chest/abdomen consisting of negatively marked multiple choice and reporting a given number of cases within a time frame. The final exam was in the format of a reporting session: 120 films to be reported in 6 hrs, divided into two 3 hour sessions. The pass mark for this section was 95%.

REPORTING IN PRACTICE

The reporting system at QMC (Queen’s Medical Centre) is “cold” reporting, i.e. after the patient has been discharged from the A&E (Accident and Emergency) department. I currently undertake an average of six 2 hour sessions a month. I report all areas of A&E with the exception of abdominal films and non trauma chest radiographs. There is no set number of cases expected to be reported

in any session as some days the cases consist predominately of NBI’s (No Bony Injury) and other days I may report half this amount with lots of complex arthropathies or patients with previous surgery or pathology. However, help is always on hand from the Radiologists whom are very supportive of this extended role.

EXTENDED ROLE

Professionally, I feel radiographic reporting has enhanced my role as a radiographer in a number of ways. Firstly I have an increased interest in plain film radiography. Reporting teaches you the radiograph is only part of the picture. Clinical history, mechanism of injury and the radiograph are equally important in the formation of a diagnostic report. You can jump to conclusions by determining a diagnosis exclusively from looking at a plain film. But by examining the history you get a better conclusion i.e. was the injury recent, are the appearances consistent with the timeframe. The mechanism of injury: are the appearances consistent with the type of trauma sustained, would this type of trauma produce an associated injury elsewhere, does the injury produce a specific type of injury e.g. twisted ankle- check for avulsion flake fractures at ligament insertions? Finally do these aspects correlate with the radiographic appearances?

I am more confident liaising with other medical professionals, particularly when working in A&E. I feel more useful when checking films as part of my daily role as a Senior Radiographer. Radiographers ask my opinion on the appearances on films and I feel I can justify exactly why I think another projection, a repeat film or why a particular request is necessary. I can offer explanations for those things on the films that you don’t think are important but you’re just not quite sure e.g. normal variants, old avulsion fractures and in this way I hope everyone will learn something, as in Radiography you really are always learning from each other. Finally, I think Radiographer reporting whether it is Barium Enema, Ultrasound or Plain films is an excellent way of improving professional self esteem, to be able to comment officially on the work we actually undertake recognises the breadth of our skills and potential for the future.

The 'Red - Dot' System

The accuracy of the red dot system: can it improve with training?

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Abstract

Purpose

This study aimed to investigate whether the introduction of a training programme for radiographers, covering the basic principles of pattern recognition and fracture detection, could increase their ability to exclude fractures within a red dot system.

Methods

The red dot system is used in trauma radiology to highlight acute abnormalities for the casualty officer. For a period of 8 weeks seven radiographers were monitored with respect to their sensitivity, specificity and accuracy of use of the red dot. These radiographers were then given a 10-week training programme in the basic principles of trauma radiology. Their sensitivity, specificity and accuracy were again monitored for a period of 8 weeks following the training. Statistical analysis was undertaken using a Student's t-test for paired samples working at the 0.05% level of significance.

Results

The accuracy of the radiographers as a group increased from 89.9% before the training to 93% after. Their sensitivity for fracture detection increased from 76.2% to 81.3%. Their specificity for fracture exclusion decreased slightly from 96.4% to 96.1%. These differences were not statistically significant. The false positive rate remained at 3% whereas the false negative rate fell from 7% to 4%.

Conclusions

Although the results were not statistically significant, there is evidence to suggest that in this context; training had an overall positive effect on the use of the red dot system by this team of radiographers. Future training programmes should focus on the areas of joint effusion, hand fracture, lower limb fracture and epiphyses which was where the errors arose within this study.

Bone Mass, Bone Loss, Osteoporosis, Menopause And Tai Chi

Various research reports that the stress hormones found in depressed women caused bone loss that gave them bones of women nearly twice their age. T'ai Chi and QiGong are known to reduce depression and anxiety and provide weight-bearing exercises to encourage building bone mass and connective tissue.

The healing power of this martial art may lie in combining movement, meditation and breathing exercises. While there are few studies on the effects of tai chi (t'ai chi ch'uan) on reducing anxiety and depression, those there are suggest that it [***tai chi***] could be beneficial, especially among the elderly.

What evidence there is suggests that the benefits of tai chi extend beyond those of simply exercising. The combination of exercise, meditation, and breathing all may help relieve anxiety and depression.

Although the practice of tai chi is very old, it hasn't been studied scientifically until recently. Preliminary research shows that practicing tai chi regularly may also:

- Increase bone mineral density after menopause
- Improve physical functioning in older adults, from more ease in dressing to increased comfort in climbing stairs
- Improve blood circulation in the legs
- Reduce anxiety and depression
- Alleviate depression, anxiety, confusion, anger, fatigue, mood disturbances and pain perception

Additional research is necessary before a clear conclusion can be reached. Although the evidence is limited, some studies have shown that tai chi is as effective as meditation and walking for reducing the amount of stress hormones in the body.

RADIOTHERAPY PACS

(Picture Archiving and Communication Systems)

RadPro newsletter April brought up this subject as PACS is fast becoming an essential part of healthcare enterprise information management. Many departments will attest to the evidence that PACS can improve efficiency, increase accessibility and reduce costs for diagnostic imaging and many interventional specialties. However the question that arises is whether there is potential for implementing a PACS built specifically for diagnostic or interventional medical imaging in a radiation oncology unit?

Skeptics say that this will often result in disappointment, since analogous benefits are rarely realized. Simply put, a general PACS system does not accommodate the unique storage and workflow needed in a radiation oncology unit.

The true promise of PACS in oncology should include:

1. **DICOM RT (Radiotherapy) Storage and Viewing**
2. **Leveraging an Existing PACS Investment**
3. **Integrated Images and Data**

DICOM (Digital Imaging and Communications in Medicine)

RT Storage and Viewing

DICOM stands for Digital Imaging and Communications in Medicine, a standard in the field of medical informatics for exchanging digital information between medical imaging equipment (such as radiological imaging) and other systems, ensuring interoperability. The standard specifies:

- a set of protocols for devices communicating over a network
- the syntax and semantics of commands and associated information that can be exchanged using these protocols
- a set of media storage services and devices claiming conformance to the standard, as well as a file format and a medical directory structure to facilitate access to the images and related information stored on media that share information.

The standard was developed jointly by ACR (the American College of Radiology) and NEMA (the National Electrical Manufacturers Association) as an extension to an earlier standard for exchanging medical imaging data that did not include provisions for networking or offline media formats.

The rapid adoption of image guided radiation therapy (IGRT) in many oncology departments has created a huge demand for the specialized storage of DICOM, as well as DICOM RT and a number of non-DICOM data objects. DICOM is the industry standard for medical images. RT is the extension used for radiotherapy modalities, which include images (RT Image), plans (RT Plan), doses (RT Dose), and contours and overlays (RT Structures).

Most general PACS cannot store these DICOM RT images and objects. A few systems may be able to accommodate some DICOM RT storage, but often there are conflicts in the acceptable formats, causing these systems to reject the information sent. Furthermore, none of these systems provide visualization of the majority of these objects. For example, oncologists may need to view overlays or outlines of anatomical structures or targets when analyzing positional shifts and they may need the ability to draw RT structures on scans. The information required to perform these tasks is often in the oncology **EMR (electronic medical record)**, so the images must be viewable within that context. Without these capabilities, a traditional PACS is only marginally useful to oncologists (i.e., a very costly “light box” that can’t display the information needed).

Leveraging an Existing PACS Investment

Having invested in a general radiology PACS, healthcare facility executives may be reluctant to make the additional oncology PACS investment. However, a truly integrated oncology PACS can connect to multiple radiology PACS and many different storage strategies. For example, if images stored on an enterprise-wide PACS are not routinely used in radiation oncology, these images may be accessed directly from the enterprise PACS. Limiting unplanned redundancy of data duplication and taking advantage of opportunities for the sharing of hardware resources are some additional benefits from integrating an oncology-specific PACS with a general PACS.

Integrated Images and Data

When oncology departments initially look at PACS, they are motivated to find a solution to their image and data storage needs. However, when one looks past storage, the specter of workflow looms in the distance. Oncology workflow, especially radiation oncology workflow, is very different from medical imaging workflow. (See FIG. 1)

Many general PACS on the market today aren't designed to tightly integrate with EMR's, because the patient chart is not the primary source of guidance for diagnostic imaging. But consistent and comprehensive access to patient delivery and imaging data is critical for oncologists. In prescribing new treatments or even managing existing directives, physicians need to see images

along with treatment histories, protocol notes, set up parameters, quantitative image guidance results, and other insightful information.

Conclusion

While a general radiology PACS is a sound investment for diagnostic imaging, it doesn't accommodate the more complex needs of radiation oncology. Hospital and cancer care administrators make a wise decision by investing in a complementary oncology-specific PACS—which supports DICOM-RT, integrates with the oncology EMR and provides a more cost-effective, centrally managed archiving system—to increase contextual accessibility, efficiency, and accuracy in radiation oncology.

FIG 1. Different workflows require different PACS

A general radiology PACS is designed to accommodate diagnostic imaging needs, in which images can be viewed and stored independently of the EMR. An oncology-specific PACS accommodates the more complex workflow of radiation oncology, which must take into account simulation, planning, delivery, and adaptation.

Typical Radiology Workflow



Radiation Oncology IGRT Workflow



MANUAL HANDLING IN RADIOTHERAPY

The RadPro April newsletter highlighted a very interesting and pertinent issue not only for the radiographers working in a radiotherapy department but also for the radiographer in a medical imaging department. As the title suggests it involves a manual procedure.

What is Manual Handling?

This term is used to describe procedures not only involving lifting or carrying something it also includes lowering, pushing, pulling, moving, holding or restraining an object, animal or person. Some of these actions may require force or effort.

Reports show that there are a large number of incidents related to back injuries resulting in severe pain and discomfort resulting from manual handling and statistics show that back pain strikes two-thirds of adults. Manual handling also contributes to injuries to the limbs, muscles, tendons and the heart and because these injuries tend to take longer to heal they have a more profound effect on longer term health.

In the United Kingdom there are strict laws designed to ensure that employers take action to prevent injury from manual handling. Main laws governing this aspect can be found in the Manual Handling Regulations 1992. There are also training courses on health and safety that incorporate manual handling run by Senior Radiographers in public and private hospitals.

The Society of Radiographers have published a manual titled "Watch your Back" focusing on Manual Handling with direct reference to radiographers because radiographers have been long aware that there are major risks among health service workers related to lifting and handling which may lead to serious injury and forced early retirement.

Some companies have joined the fight to eliminate problems arising from manual handling by coming up with new designs of products to handle heavy objects. An example of this is the "Physics Instrument's ECOlog" system, designed for handling, moving and storing heavy and cumbersome electron applicators.

Physics Instruments was founded in 1987 and specialises in supply of equipment and systems for measurement, monitoring and applications of ionising radiation and ultrasound. Products include Quality Assurance Phantoms and Radiation Dosimetry for Radiotherapy and Clinical Diagnostic Imaging including CT MR PET and ultrasound test equipment and ultrasound power meters.

The ECOlog system from Sweden features trolleys specially designed for storage and application of the collimators as well as for storage of custom made inserts and related accessories. Each trolley has a number of shelves keeping the inserts and the other parts related to the collimator conveniently at hand. The electron collimator for Elekta linear accelerators is located on a lever controlled mechanism at the top of the trolley. Variants are available also for Siemens and Varian treatment machines. Each size of collimator has its own trolley thus eliminating tedious changing procedures. The trolleys are designed to be placed close to each other by a wall and they are replacing a shelf otherwise necessary for the collimators and accessories. In this way the trolleys will not occupy more space than needed in treatment rooms not equipped with the EcoLog system.

Article and pictures used with permission from Oncolog Medical AB

*For a better understanding visit
<http://www.oncolog.net/>
for flyers and videos regarding EcoLog.*

EcoLog trollies for Elekta, Varian and Siemens electron collimators (applicators)

EcoLog E



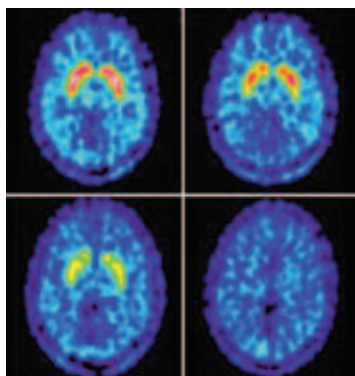
EcoLog V



EcoLog S



MOLECULAR IMAGING



Drs. Thakur and Lentle, respectively Presidents of the Society of Nuclear Medicine and of the RSNA, have recently defined Molecular Imaging as follows:

"Molecular Imaging is a technique which directly or indirectly monitors and records

the spatiotemporal distribution of molecular and cellular processes for biochemical, biologic, diagnostic or therapeutic applications." - *J. Nucl. Med.* 2005; 46:11N-13N

The field of molecular imaging originated from the field of radiopharmacology due to the need to better understand the fundamental molecular pathways inside organisms in a noninvasive manner.

Molecular imaging uses biomarkers to help image various targets or pathways, particularly in vivo. Biomarkers interact chemically with their surroundings and in turn alter the image according to the molecular changes occurring within the area of interest.

Previous methods of imaging primarily imaged differences in qualities such as densities or water content. This ability to image very fine molecular changes opens up an incredible number of exciting possibilities for medical application, including early detection and treatment of disease as well as for basic pharmaceutical development. Furthermore, molecular imaging allows for quantitative tests, which adds a level of objectivity to the study of these areas.

There are many different areas of research being conducted in the field of molecular imaging. Much research is on detecting what is known as a pre-disease state or molecular states that occur before typical symptoms of a disease are detected.

Other important veins of research are the imaging of gene expression and the development of novel biomarkers.

Imaging modalities

There are many different modalities that can be used for non-invasive molecular imaging. Each has their different strengths and weaknesses and some are more adept at imaging multiple targets than others.

Magnetic Resonance Imaging (MRI)

- MRI has the advantages of having very high spatial resolution and is very adept at morphological imaging and functional imaging.
- MRI does have several disadvantages though. MRI has a sensitivity of around 10-3 mol/L to 10-5 mol/L which compared to other types of imaging can be very limiting. This problem stems from the fact that the difference between atoms in the high energy state and the low energy state is very small. For example at 1.5 teslas the difference between high and low energy states is approximately 9 molecules per 2 million. Although with the use of small animal scanners much higher strength magnets can be used which can detect much lower concentrations than weaker magnets.

Optical imaging and Ultrasound

- Optical imaging and ultrasound's most valuable attribute is that it does not have strong safety concerns like the other medical imaging modalities.
- The downside of optical imaging is the lack of penetration depth.

Single photon emission computed tomography (SPECT)

- The main purpose of SPECT when used in brain imaging is to measure the regional cerebral blood flow (rCBF).
- The development of computed tomography in the 1970s allowed mapping of the distribution of the radioisotopes in the brain, and led to the technique now called SPECT.
- The imaging agent used in SPECT emits gamma rays, as opposed to the positron emitters used in PET. There are a range of radiotracers that can be used, depending on what is to be measured. Xenon (¹³³Xe) gas is one such radiotracer.

- It has been shown to be valuable for diagnostic inhalation studies for the evaluation of pulmonary function and may also be used to assess rCBF. Detection of this gas occurs via a gamma camera—which is a scintillation detector consisting of a collimator, a NaI crystal, and a set of photomultiplier tubes.
- By rotating the gamma camera around the head, a three dimensional image of the distribution of the radiotracer can be obtained by employing filtered back projection. The radioisotopes used in SPECT have relatively long half lives (a few hours to a few days) making them easy to produce and relatively cheap.
- This represents the major advantage of SPECT as a brain imaging technique, since it is significantly cheaper than either PET or MRI. However it lacks good spatial (i.e., where exactly the particle is) or temporal (i.e., did the contrast agent signal happen at this millisecond, or that millisecond) resolution. Additionally, due to the radioactivity of the contrast agent, there are safety aspects concerning the administration of radioisotopes to the subject, especially for serial studies.

Positron emission tomography (PET)

- The theory behind PET is simple enough. First a molecule is tagged with a positron emitting isotope. These positrons annihilate with nearby electrons, emitting two 511,000 eV photons, directed 180 degrees apart in opposite directions. These photons are then detected by the scanner which can estimate the density of positron annihilations in a specific area. When enough interactions and annihilations have occurred, the density of the original molecule may be measured in that area.
- Typical isotopes include ^{15}O , ^{18}F , ^{64}Cu , ^{62}Cu , ^{124}I , ^{76}Br , ^{82}Rb and ^{68}Ga .
- One of the major disadvantages of PET is that most of the probes must be made with a cyclotron. Most of these probes also have a half life measured in hours, forcing the cyclotron to be on site. These factors can make PET prohibitively expensive.
- PET imaging does have many advantages though. First and foremost is its sensitivity: a typical PET scanner can detect between 10^{11} mol/L to 10^{12} mol/L concentrations.

Discover the power of Positron Emission Tomography (PET)

When your doctor refers you for a PET scan, you will be introduced to a medical imaging technique that can search for cancer anywhere in your body, can diagnose Alzheimer's disease years before symptoms occur or prove that bypass surgery would benefit your damaged heart. PET is changing the way doctors manage your care for some of today's most devastating medical conditions.

PET is a powerful diagnostic test that is having a major impact on the diagnosis and treatment of disease. Because disease is a biological process, and PET is a biological imaging examination, PET can detect and stage most cancers, often before they are evident through other tests. PET can also give physicians important early information about heart disease and many neurological disorders, like Alzheimer's.

A PET scan examines your body's chemistry. Most common medical tests, like CT and MR scans, only show details about the structure of your body. PET is different. It also provides information about function. With a single PET procedure, physicians can collect images of function throughout the entire body, uncovering abnormalities that might otherwise go undetected.

For example, a PET scan is the most accurate, non-invasive way to tell whether or not a tumor is benign or malignant, sparing patient's expensive, often painful diagnostic surgeries and suggesting treatment options earlier in the course of the disease. And although cancer spreads silently in the body, PET can inspect all organs of the body for cancer in a single examination!

History

The first primarily used commercial PET scanner was introduced in 1975. In the 70's and 80's PET was mainly used for research. During the early 90's PET expanded into hospitals, diagnostic clinics, mobile systems and physician practices as more and more of the medical community began to realize the utility of PET.

PET began in the 70's as a research tool. The technology advanced from digital coincidence to 3-D images in the 80's. Then in the late 90's a new detector material was invented called LSO (Lutetium Oxyorthosilicate). In 2000, a combination PET/CT scanner went into production providing the physician and the patient with the

most complete and accurate image, as well as the highest quality diagnostics within a single scan.

When disease strikes, the biochemistry of your tissues and cells changes

In cancer, for example, cells begin to grow at a much faster rate, feeding on sugars like glucose. PET works by using a small amount of a tracer drug chemically attached to glucose or other compounds. You are injected with the tracer. It travels through your body emitting signals and eventually collects in the organs targeted for examination. If an area in an organ is cancerous, the signals will be stronger than in the surrounding tissue. A scanner records these signals and transforms them into pictures of chemistry and function.

PET is able to detect extremely small cancerous tumors and very subtle changes of function in the brain and heart. This allows physicians to treat these diseases earlier and more accurately. A PET scan puts time on your side! An earlier the diagnosis leads to better treatment.

PET gives patients hope.

How PET can make a difference in cancer management

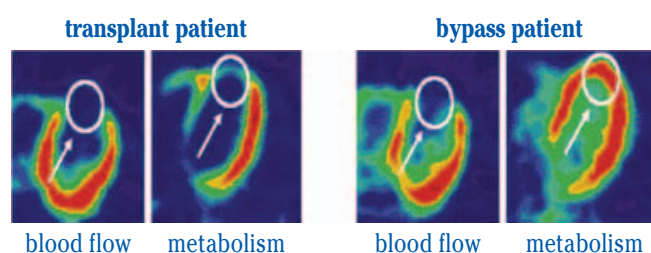
In cancer, PET can:

- distinguish benign from malignant tumors
- stage cancer by showing metastases anywhere in your body
- prove whether or not treatment therapies are working

Early intervention is PET's most important benefit. The earlier the detection, the likelier the cure! Prior to changes in structure that normally would show up on a CT or MRI scan, a PET scan can reveal metabolic changes in the body. How? PET is a metabolic imaging technique and cancer is a metabolic process. PET shows whether or not a tumor is benign or malignant. No other imaging technique can do this! Reports in the scientific literature find that PET correctly identifies detected lesions 97% of the time. Painful, invasive surgery, such as thoracotomy, may no longer be necessary for diagnosis.

PET shows the extent of disease — called staging — of lung cancer, colorectal cancer, melanoma, head and neck cancer, breast cancer, lymphoma and many other cancers. For patients whose cancer is newly diagnosed, it is important to

determine if the cancer has spread to other parts of the body, so that appropriate treatment can be started. PET can search the entire body for cancer in a single examination, called a “whole body scan”, revealing any metastases as well as the primary site. PET shows the effectiveness of therapy. It is an excellent test to monitor for recurrence of disease. One ovarian cancer patient had a PET scan when a blood test indicated a rise in her tumor marker levels but subsequent CT and MRI scans were still normal. Only the PET scan showed new cancer. After treatment, a subsequent PET scan revealed the cancer was gone.



The role of PET in heart disease management

In the heart, PET can:

- quantify the extent of heart disease
- determine, after a heart attack, if the heart muscle would benefit from surgery

Positron emission tomography of the heart allows the study and quantification of various aspects of heart tissue function. Clinical studies show an important role for PET in diagnosing patients, describing disease and developing treatment strategy.

Two areas of clinical application have emerged:

- PET is the most accurate test to reveal coronary artery disease and impaired blood flow or rule out its presence.
- PET is the gold standard to determine the viability of heart tissue for revascularization. PET can determine whether bypass surgery or transplant is the appropriate treatment.

How PET can make a difference in neurological disorders?

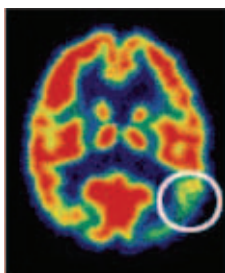
In the brain, PET can:

- positively diagnose Alzheimer's disease for early intervention
- locate tumors in the brain and distinguish tumor from scar tissue

- locate the focus of seizures for some patients with epilepsy
- more accurately assess tumor and other sites in the brain for delicate surgery

Suffering from memory loss? PET can determine if the cause is Alzheimer's disease, blood flow shortages, depression, or some other reason.

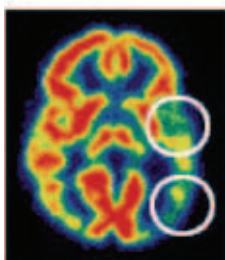
PET can localize the brain site of seizure activity. This is especially important for children with uncontrollable seizures who are candidates for hemispherectomy as cure.



**Abnormal
glucose
metabolism
indicative
of seizures**

PET can tell if that muscle tremor is Parkinson's disease or another of the "Movement" disorders.

PET can look at brain tumor and reveal if it's benign or malignant. It is also widely used when recurrence is suspected to show whether structural change is tumor re-growth or merely scar tissue.



**Removal of
dysfunctional
brain areas**

PET can "map" the areas of the brain responsible for movement, speech, and other critical functions. This is a remarkable guide for surgeons who are performing delicate operations on different areas of the brain.

Some disadvantages of the currently available Molecular Imaging modalities

Molecular imaging is already benefiting clinical care, but if its myriad potential benefits are to be realized in routine practice, the community must work together to define, demonstrate, and promote the value of molecular imaging for improvement in health care and lead the transition to personalized medicine. In the near term, this effort should involve the creation of a range of multi-center clinical trials to demonstrate benefits in outcomes and management change, enhanced cooperative efforts to streamline and make practical the development of new radiopharmaceuticals, and the creation of durable outreach channels to educate and advance in partnership with the public, referring physicians, specialists in other disciplines, and federal and regulatory bodies.

1. Some radioisotopes have short half-life, low spatial resolution, a high cost of instrumentation, especially when an on-site cyclotron is required, and past problems gaining Food Drug Administration approval and Medicare (insurance) reimbursement for PET radiopharmaceuticals
2. Although PET has been a main focus, SPECT should be considered as well. The main advantage of SPECT is the ability to image more than a single isotope at once. The main disadvantage is the lack of quantification
3. Molecular imaging has grown up as a multidisciplinary program with medical physicists. What training and background should be required for clinical molecular imagers, and how can we foster excellence in clinical imaging through training?
4. Oncologists rely on CT measures of tumor diameter and volume to determine whether chemotherapy is working. But it can take many months before changes are seen, and at that point, the disease may have progressed too far for a change in therapy to be of any benefit.
5. It is less certain whether FDG-PET can serve as a surrogate marker for radiotherapy. Cancer cells that show signs of radiation-induced inflammation can metabolize FDG before they die, in a manner that could be confused with uptake associated with active cell growth
6. When selecting an imaging modality, one has to consider: its spatial and temporal resolution, its depth penetration, the availability of injectable/biocompatible molecular probes, and the respective detection threshold of probes for a given technology.

Recommendations

1. Promote utilization of new radiopharmaceuticals through clearly defining critical areas of development
2. validating outcomes and efficiency
3. enlisting patient advocacy
4. Reach out to the larger community that will be affected by the benefits of molecular imaging
5. including efforts to improve referring physician and clinician education,
6. incorporate molecular imaging into clinical management algorithms

7. encourage patient advocacy groups
8. interact with clinical trial networks in oncology (perhaps by securing a seat at the decision-making tables),
9. provide specific education and information to the medical specialties, especially psychiatry and cardiology
10. Continue the SNM-industry coalition, including enhanced efforts at communication with the U.S. Food and Drug Administration (FDA) and other federal bodies. Participants suggested that the FDA might be invited to participate in coalition meetings.
11. Encourage the formation of a national taskforce on molecular imaging by the National Academy of Sciences.
12. Encourage the creation of multi-center clinical trials to evaluate response in targeted therapies, quantification of perfusion in cardiac studies, cost/benefit effectiveness of PET and other techniques, and explore a range of oncology, CNS, and other benefits.
13. Ask the SNM Brain Imaging Council to investigate the question of the perceived "disconnect" between the availability of novel CNS probes and clinical applications.
14. Encourage funding and regulatory bodies, as well as other disciplines, to accept changes in patient management resulting from imaging findings as review benchmarks.
15. Encourage clinical trials for validation of dynamic PET for determination of absolute blood flow.
16. Encourage standardization of acquisition and processing in all areas of clinical molecular imaging.

Molecular Imaging Moves to the Clinic

A major advantage of nuclear imaging methodologies is the ability to rapidly translate from bench to bedside. As a basis for molecular imaging, radiotracer imaging methodologies are slowly being built up to image the following aspects of cancer biology:

- (1) Cancer phenotype, especially the differences between malignant cells and their normal counterparts. Probes for altered metabolism, protein expression, and molecules associated with distinctive behavior, such as the tendency to metastasize, are being investigated (e.g., accelerated amino acid metabolism, such as 18F-aminocyclobutane carboxylic acid; 11C methionine in castrate-resistant prostate cancer; 18F-fluorodihydrotestosterone in prostate cancer and characterizing specific antigen expression with G250 in clear cell renal cancer).
- (2) Tumor microenvironment. Hypoxia, neo-vasculature, alterations in the stroma of cancer cells, and the interaction of cells within the cancer mass (e.g., 18Fmisonidazole for hypoxia) are all under investigation.
- (3) Imaging-guided targeted molecular radiotherapy.
Targeted radiotherapy is a major advance in nuclear medicine that is being refined by advances in molecular imaging and used to measure dosimetry of tumor and normal tissues (e.g., 124I-NaI for imaging of thyroid cancer). Currently, preclinical advances are occurring in areas such as:
 - (a) Cancer pharmacology, including drug-based tracers, multidrug resistance, pharmacokinetics and pharmacodynamics of important cancer drugs (e.g., targeting of Her 2 Fab'2 68Ga and 124I-HSP90 inhibitors to human tumors).
 - (b) Tumor immunology, including the interaction of antitumor antibodies, immune cells, and cancer cells within the tumor mass (e.g., targeting of immune cells in Epstein-Barr virus lymphoma).
 - (c) Gene expression imaging, especially the ability to image key genes important to the altered phenotype of cancer, cancer pharmacology, and the interaction of cancer cells with the tumor micro-environment.



22nd SINGAPORE-MALAYSIA RADIOGRAPHERS CONFERENCE

22nd Singapore - Malaysia Radiographers' Conference
18 -19 August 2007 @ Grand Plaza Park Hotel City Hall
Email: 22smrc@gmail.com URL: www.ssr.org.sg

OFFICIAL REGISTRATION FORM

Particulars (Please fill in all fields)

| | | | |
|-------------|-----------------------------------|----------|-------|
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| Designation | _____ | | |
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| Email | _____ | | |

Registration Fees (Please tick the appropriate categories)

- | | |
|--|--------|
| <input type="checkbox"/> SSR / MSR Member | S\$200 |
| <input type="checkbox"/> Other affiliated Society Member | S\$200 |
| <input type="checkbox"/> Student Member | S\$120 |
| <input type="checkbox"/> Late registration (after 15 Jul 07) | S\$250 |
| <input type="checkbox"/> Non-Member | S\$250 |
| <input type="checkbox"/> Social (Official Dinner only) * | S\$75 |

NB: All conference fees include the official conference banquet

* For spouses of delegates

Payment

- ☐ Cheque (Singapore Dollars)
☐ Bank Draft (Singapore Dollars)

Cheque and Bank Draft to be made payable to:
"Singapore Society of Radiographers"

Refund Policy

The following cancellation and refund policy will apply:

| | | |
|--------|-----------|-----|
| Before | 15-Jul-07 | 50% |
| After | 15-Jul-07 | Nil |

IMPORTANT INFORMATION

REGISTRATION

Please complete this form in BLOCK print and forward it together with your payment to:

The Secretariat
22nd SMRC
Ang Mo Kio Central Post Office
P.O. Box 765
Singapore 915609

Registration will be confirmed only upon receipt of payment. Proof of postage is not proof of receipt.

All enquiries should be directed to The Secretariat via email: 22smrc@gmail.com

MEMBERSHIP

SSR members with outstanding arrears shall be charged the rate of non-members. Membership status shall be verified by the Executive Council, whose decision is final.

SOCIAL ATTENDANCE

Registered social participants are invited to the official conference banquet on 18th Aug 2007. They will be ineligible to attend other events of the conference.

For Official Use Only:

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Cheque: _____ Receipt: _____

SINGAPORE SOCIETY OF RADIOGRAPHERS
22nd SINGAPORE - MALAYSIA RADIOGRAPHERS' CONFERENCE
(18 & 19 AUGUST 2007)

HOTEL BOOKING FORM

Please fax/email return directly to :

GRAND PLAZA PARK HOTEL CITY HALL

10 Coleman Street Singapore 179809

Contact Person : Ms Maslinda (Reservations Supervisor)

Tel : (65) 6336 3456 Fax : (65) 6339 6202

Email : rsvn@chsg.parkhotelgroup.com

Official Hotel : Grand Plaza Park Hotel City Hall

| HOTEL | ROOM RATE PER NIGHT | | ROOM TYPE | | |
|---|--|--------------------|-----------------|-----|----------|
| | <i>Single</i> | <i>Double/Twin</i> | | | |
| Grand Plaza Park Hotel City Hall | Superior (Room Only) | \$160.00 | \$180.00 | Sgl | Dbl Twin |
| | Superior (Room w breakfast) | \$180.00 | \$220.00 | Sgl | Dbl Twin |
| | ----- | | | | |
| | Park Privilege Club Superior* | \$210.00 | \$250.00 | Sgl | Dbl Twin |
| | Executive Suite * | \$350.00 | \$390.00 | Sgl | Dbl Twin |
| | * rates are inclusive of breakfast, evening cocktail, free in-room internet access, priority check-in/out & 2 pcs laundry daily. | | | | |

Above rates quoted are in Singapore Dollars and subject to 10% service charge all & prevailing GST.

| | | | | | |
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| Title | | Given name | | Family name | |
| Organisation | | | | | |
| Address | | | | | |
| City/Zip/Postcode | | Country | | | |
| Email | | Tel | | Fax | |

| | | | | | |
|----------------|--|------|--|-----------|--|
| Arrival date | | Time | | Flight no | |
| Departure date | | Time | | Flight no | |

NAME OF GUEST SHARING ROOM (if any)

| | | | | | |
|-------|--|------------|--|-------------|--|
| Title | | Given name | | Family name | |
|-------|--|------------|--|-------------|--|

| | |
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| AMOUNT | |
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| Issuing Singapore based bank | |
| 2. Credit card | <input type="checkbox"/> Visa <input type="checkbox"/> Master <input type="checkbox"/> Amex |
| Cardholder name | Cardholder's signature & date |
| Credit card no. | |
| Expiry date | |



Hotel Overview

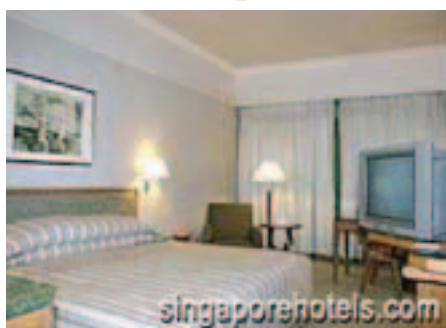
Strategically located at the corner of Coleman Street and Hill Street, in the heart of the Heritage District and just a short walk from the City Hall MRT Station, the Grand Plaza Park Hotel City Hall Singapore is close by to the Financial District, Chinatown as well as the Singapore River arts district.

The Grand Plaza Park Hotel City Hall has 327 tastefully decorated rooms that are luxurious without being stuffy and feature all the amenities you would expect of a four star hotel. With its ease of access to all major areas of the city as well as some great shopping, entertainment and dining right outside your door, the Grand Plaza Park Hotel City Hall does a nice job catering to both leisure and business travelers.



THE HOTEL

Room Description



THE ROOM

All individually controlled air-conditioned rooms in the Grand Plaza Park Hotel City Hall Singapore feature a fully-stocked minibar with refrigerator, television with cable channel and in-house movies, IDD telephone, coffee/tea making facilities, in-room safe, hairdryer and private bathroom. Non-smoking rooms are available. For those who require more luxurious accommodation, the Grand Plaza Park Hotel City Hall offers its Orchid Club Rooms. Specially designed to meet the needs of today's travelling executive with a work desk and high speed internet data ports. Orchid Club privileges include private access to executive floors, as well as the Orchid Club Lounge for complimentary breakfast, afternoon tea and evening cocktails.



HOTEL LOCATION MAP

HOTEL BOOKING IMPORTANT INFORMATION:

- 1) All hotel reservations should be made with the hotel directly.
- 2) Please note that reservations will only be confirmed when the hotel receives from you a non-refundable deposit equivalent to one night's room rate.
- 3) Please forward your reservation/payment latest by Wed, 01 Aug 2007 to confirm your booking on a definite basis. Subsequently, should you cancel your reservation 24 hours prior to your arrival, the one-night deposit will be forfeited.
- 4) For payment by bank draft in Singapore Dollars, please make your cheque payable to: "Grand Park Property Pte Ltd".
- 5) Check-in time is 1400 hours and check-out time is 1200 hours. For early check-in between 0600 hours and 1000 hours, it is recommended that the room be booked from the night before.
- 6) Please inform us of any changes of your reservation in writing.
- 7) The SSR will not be responsible for all hotel bookings.



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CITITEL EXPRESS

449, Jalan Tuanku Rahman, Kuala Lumpur, Malaysia.

http://www.pinganchorage.com.my/malaysia_hotel/kuala_lumpur_cititel_express_hotel.htm

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| Rate valid till 31st Dec 2007 | Rate |
|-------------------------------|----------------|
| Standard Room with Breakfast | RM 148.00 nett |
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| Deluxe Room with Breakfast | RM 219.00 nett |

All rates are nett quoted in RM and INCLUDE 5% government tax & 10% service charge. Extra bed is chargeable at RM 49.00 nett per unit per night (for Superior & Deluxe Room only). Surcharge of RM 40.00 per room per night on Peak Season. Rates not valid on UMNO AGM, date to be advised.



ADDITIONAL INFORMATION

Rating : 3 star

Check-in time – 14:00pm

Check-out time – 12:00nn

Strategically located on the fringes of the golden triangle of Kuala Lumpur City Centre, along Jalan Tuanku Abdul Rahman, this street was affectionately known as Batu Road, famed for its cobbled side streets of “Little India” hawking colourful silk saris, ornaments, masses of carpets, textiles, centuries old kopi tiam (coffee shops) and varieties of local hawker fares. A short distance away is Twin Towers, Kuala Lumpur Convention Centre and some of the main tourist belts. The Cititel Express offers easy access to the city’s hottest spots. Leisure and business travelers will find the modest accommodations well-designed for their comfort and convenience.

ROOM AMENITIES

Accommodation comprises of 90 standard rooms in the Podium Block and 109 Superior and 44 Deluxe rooms in the Tower Block. Rooms are decorated with neutral tones, offering Most of the basic amenities sufficient for your needs. It caters to both the business and leisure travelers where the selection of rooms is available to suit each taste and budget. 244 comfortable furnished rooms offering: Individually controlled air-conditioning, hair dryer, television, broadband connectivity, in-room locker, shower cabin. Additional features in Superior and Deluxe Rooms: International direct dial, Coffee/tea making facilities and Mini fridge.

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Close to government offices, financial Institutions and commercial districts. Part of the vibrant precinct of Little India, numerous textile, carpets and other retail shops and a good stroll to the Sogo Shopping Mall. Instant access to the city mono rail, immediate connections to the Express Rail between KL Sentral and KLIA. Convenient interchange stations to the city’s two other inter district light rails and interstate railway . 10 minutes walk to Putra World Trade Centre, 10 minutes by car to Kuala Lumpur Convention Centre. 65 kilometres or 28 minutes ride by Express Rail between KLIA and KL Sentral.





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Strategically located on the fringes of the golden triangle of Kuala Lumpur City Centre, along Jalan Tuanku Abdul Rahman, this street was affectionately known as Batu Road, famed for its cobbled side streets of "Little India" hawking colourful silk saris, ornaments, masses of carpets, textiles, centuries old kopi tiam (coffee shops) and varieties of local hawker fares. A short distance away is Twin Towers, Kuala Lumpur Convention Centre and some of the main tourist belts.

The Cititel Express offers easy access to the city's hottest spots. Leisure and business travelers will find the modest accommodations well-designed for their comfort and convenience.



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Enquiries : infokui@cititelexpress.com

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McCasa All Suite Hotel | McCasa Hotel Apartments

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Best viewed with IE 5 and above. Screen resolution 1024 x 768.

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PET /CT Basics

Positron Emission Tomography (PET) and Computerized Tomography (CT) are both standard imaging tools that allow physicians to pinpoint the location of cancer within the body before making treatment recommendations.

The highly sensitive PET scan detects the metabolic signal of actively growing cancer cells in the body and the CT scan provides a detailed picture of the internal anatomy that reveals the location, size and shape of abnormal cancerous growths.

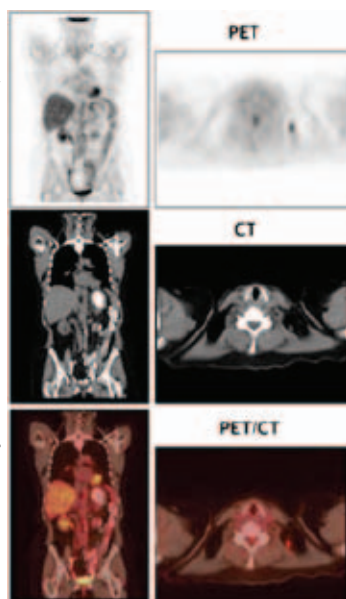
Alone, each imaging test has particular benefits and limitations but when the results of PET and CT scans are “fused” together, the combined image provides complete information on cancer location and metabolism.

The bottom line is that you can have both scans - PET and CT - done at the same time.

What is PET/CT?

In one continuous full-body scan (usually about 30 minutes), PET captures images of minuscule changes in the body's metabolism caused by the growth of abnormal cells, while CT images simultaneously allow physicians to pinpoint the exact location, size and shape of the diseased tissue or tumor.

Essentially, small lesions or tumors are detected with PET and then precisely located with CT.



How PET/CT Works

While a CT scan provides anatomical detail (size and location of the tumor, mass, etc.), a PET scan provides metabolic detail (cellular activity of the tumor, mass, etc.). Combined PET/CT is more accurate than PET and CT alone!

Anatomical: CT scanners send x-rays through the body, which are then measured by detectors in the CT scanner. A computer algorithm then processes those measurements to produce pictures of the body's internal structures.

Metabolic: PET images begin with an injection of **FDG***, an analog of glucose that is tagged to the radionuclide F18. Metabolically active organs or tumors consume sugar at high rates, and as the tagged sugar starts to decay, it emits positrons. These positrons then collide with electrons, giving off gamma rays, and a computer converts the gamma rays into images. These images indicate metabolic “hot spots,” often indicating rapidly growing tumors (because cancerous cells generally consume more sugar/energy than other organs or tumors).

* What is FDG?

2-Deoxy-2-[18F]fluoro-D-Glucose, or FDG, is a type glucose (sugar) and is the most common radiopharmaceutical used in PET. To begin the PET procedure, a small amount of glucose is injected into your bloodstream. There is no danger to you from this injection. Glucose is a common substance that every cell in your body needs in order to function. Diabetic patients do not need to worry; it would take 1,000,000 doses of FDG to equal the glucose in 1 teaspoon of sugar. FDG has a half-life of approximately 110 minutes, so it is quickly expelled from your body. FDG must pass multiple quality control measures before it is used for any patient injection.

The entire examination usually takes less than 30 minutes, providing comprehensive diagnostic information to your health care team very quickly. The PET/CT system provides exceptional image quality and accuracy of diagnostic information.

What PET/CT Sees

PET/CT scanning integrates PET and CT technologies into a single device, making it possible to obtain both anatomical and biological data during a single exam. This integrated approach permits **accurate tumor detection and localization for a variety of cancers.**

PET/CT applications:

- Determines extent of disease
- Determines location of disease for biopsy, surgery or treatment planning
- Assesses response to and effectiveness of treatments
- Detects residual or recurrent disease
- May assist in avoiding invasive diagnostic procedure

Benefits of PET/CT

There are tremendous benefits of having a combined PET/CT scan:

- Earlier diagnosis
- Accurate staging and localization
- Precise treatment and monitoring

With the high-tech images that the PET/CT scanner provides, patients are given a better chance at a good outcome and avoid unnecessary procedures. A PET/CT image also provides early detection of the recurrence of cancer, revealing tumors that might otherwise be obscured by scar tissue that results from surgery and radiation therapy, particularly in the head and neck.

In the past, difficulties arose from trying to interpret the results of a CT scan done at a different time and location than a PET scan, due to the fact that the patient's body position had changed. The combination PET/CT provides physicians a more complete picture of what is occurring in the body - both anatomically and metabolically - at the same time.

The Story of PET/CT

Doctors, especially cancer surgeons, were often frustrated in trying to match PET images with CT images to determine the precise location of a tumor in relation to an organ or the spinal column. They had little choice other than to “eyeball” the two separate images and make an educated guess as to the tumor's exact location - until 1992, when engineer Ron Nutt and physicist David Townsend came up with the idea of combining a PET and CT into one machine.

After working on their combined PET and CT concept for three years, Nutt and Townsend received a grant from the National Cancer Institute. This enabled the completion of a prototype machine, which was installed at the University of Pittsburgh medical center in 1998.

The pair designed the machine to be more patient-friendly by making the diameter of the PET/CT tunnel 28 inches, far more spacious than the typical MRI tunnels.



REGISTRATION FORM

THE MALAYSIAN SOCIETY OF RADIOGRAPHERS

STUDY DAY (I)

'UPDATE PET CT'

Sat. 7th July 2007

CITITEL EXPRESS – KUALA LUMPUR

449, Jalan Tuanku Abdul Rahman, 50100 Kuala Lumpur, Malaysia. Tel: +603 26919833. Fax: +603 26913103

Reservation: resvnlul@cititelexpress.com Enquiries: infokul@cititelexpress.com

<http://www.cititelexpress.com/KL/index.html>

Please print clearly, completing all the blanks.

☐ Mr ☐ Mrs ☐ Miss ☐ Ms

First Name: _____ Middle Name: _____ Family Name: _____

Organisation: _____ Position: _____

Address: _____

City: _____ State/Province: _____ Postal Code: _____ Country: _____

Tel: _____ Fax: _____ Email: _____

SCIENTIFIC MEETING

☐ Vegetarian ☐ Non vegetarian

Life Member / Ordinary Member RM 50.00 (please produce LM Card/photocopy membership payment receipt)

Non Member RM 100.00

ON SITE REGISTRATION NOT RECOMMENDED.

METHODS OF PAYMENT

☐ Bank draft/cheque only in Ringgit Malaysia made payable to "Malaysian Society of Radiographers"

☐ Bank Draft/Cheque Number:

CANCELLATION AND REFUND

- 1) Notice of cancellation must be received on or before **1st July 2007** by e-mail, fax or regular mail. There will be no refund for notice of cancellation received after **1st July 2007**.
- 2) The Organiser reserves the right to alter the content and timing of the programme for reasons beyond its control.
- 3) Registration with full payment only will be accepted.

For Registration : Please post, fax or email

MSR Secretariat, c/o Department of Diagnostic Imaging, Kuala Lumpur Hospital, 50586 Kuala Lumpur.

Tel: 603-2615 5932, 603-2092 3995 ext. 722. Fax: 603-2698 4035. Email: ms_radiographer@yahoo.com

P R O G R A M M E

The Organisers reserve the right to alter the Programme due to unavoidable circumstances

| Day / Hrs | 0800 | 0900 | 1000 | 1100 | 1200 | 1300 | 1400 | 1500 | 1600 | 1700 |
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| Saturday | | | | | | | | | | |
| 7-Jul-07 | | | | | | | | | | |

REGISTRATION

SCIENTIFIC MEETING

LUNCH

1. Introduction to Molecular / Functional Imaging
2. PET (instrumentation) - PET Scanner, Cyclotron
3. Radiopharmaceutical for PET Imaging
4. Radiation Protection in PET Imaging
5. PET Clinical Radiology
6. PET Clinical Radiotherapy
7. Q & A Session



**INTERNATIONAL
SOCIETY OF
RADIOGRAPHERS
& RADIOLOGICAL
TECHNOLOGISTS**

*...an international nongovernmental
organisation in Official Relations with the
World Health Organisation*

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www.isrrt.org

Report to the Board of ISRRT on attending the Annual General Meeting of the Malaysian Society of Radiographers – April 13-15th, 2007

I recently accepted the invitation of the President of the Malaysian Society, Salmah, to present the Keynote address at their AGM / Annual Conference. They had the Minister for Medical Development Opening the Conference. Salmah also advised me that she would be retiring as President after 8 years. As you are aware, the Malaysian Society has always been a strong supporter of ISRRT in the Region and at our Congresses and meetings.

Their theme was "Bridging Technology and Practice". I took part in a spirited discussion forum on the Friday evening on the future role of technologists and presented a 1 hour keynote address on Saturday Morning focussing on "the future for Radiographers... opportunities and challenges." I also gave a 30 min presentation at the Saturday evening dinner on "emerging technologies" – if anyone would like a copy of these I will be happy to post a CD as they are large files. There were several excellent presentations on the Saturday covering Digital radiography, Ultrasound, Education, PACS, Digital mammography and even "Service at the front counter"! I have also asked for one of their recent newsletter articles to be sent to me so that I can forward it to Fozy for inclusion in our Newsletter – It is on and is a very succinct and relevant piece on "Effective Communication" and is applicable to all of our Societies.

The Society held their AGM on the Sunday and Mohd. Zin Yusof was elected as the new President and therefore ISRRT Council Member. He was previously the VP and is the chief Technologist at the KL Gen Hosp. Packya was re-elected as Hon Sec – a role he fills with great enthusiasm and commitment. I told the Society that I saw him as the Malaysian equivalent of Terry West and Sandy Yule – but much younger!! He was very embarrassed.

The Society is very active with approx 2,000 members – 200 from the growing Private Sector. Their education is either Diploma or also a Degree option. Role extension is minimal – ultrasound is still a doctor's role but there are now some science graduates being trained. This is a cause of some annoyance but it seems most radiographers are reluctant to take up the challenge – I think this will change in the near future with some going off shore for training which is to be encouraged – the alternative is for external teachers to establish a post graduate program in KL in association with a University program – e.g. the University of South Australia or Monash University both of which already have strong links in KL. .



Rob George,
ISRRT President,
9/4/2007

They have Multislice CT and MR – also 2 PET /CT units but their basic training is lacking in these modalities, as we know. Hence the request to ISRRT for some additional training in CT and MR. The very generous Phillips option at the International Training Centre in Singapore whilst preferable looks unrealistic for them as the cost even for fares and accommodation would be prohibitive. Also, they would apparently be unlikely to receive any Govt support to go offshore. An alternative is for ISRRT to develop a program, which could be held over 5 days including a weekend in KL if Government support was available - this would be very well supported and extremely beneficial.

Whilst the invitation to attend the AGM etc was unanticipated, I feel it was very valuable for them and for ISRRT– some may not be aware that the 2005 decision for hosting the 2007 ACRT meeting was tied between Malaysia and India but that Malaysia withdrew to allow India to host the ACRT meeting in November this year. I hope they bid for the 2009 ACRT meeting. We also look like having a strong contingent in Durban from Malaysia.

The ISRRT is registered as a charity in the United Kingdom – Registration No. 276218