GCMI
Gold Coast Medical Imaging Pty Ltd
Tweed Valley Radiology
IMAGING UPDATE
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THE OFFICIAL NEWSLETTER OF GOLD COAST MEDICAL IMAGING/TWEED VALLEY RADIOLOGY

HRT AND OSTEOPOROSIS

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Dr Barry Chatterton, Nuclear Medicine Physician, of Dr Jones and Partners Medical Imaging looks at the Women's Health Initiative Trial results, Osteoporosis and Bone Densitometry. Dr Jones and Partners Medical Imaging is based in Adelaide and is a member of the I-Med network of radiology companies, which Gold Coast Medical Imaging and Tweed Valley Radiology are also affiliated.

For many years it has been known that oestrogen therapy had a marked effect in the prevention of bone loss after menopause. Progestins have less effect on bone density, but are used to offset the undesirable effects of unopposed oestrogen on the endometrium. Because of the lower rate of cardiovascular disease in premenopausal women, it has been assumed by many that this lower risk would continue whilst taking hormone replacement therapy. Breast and uterine cancers have been a concern.

The Women's Health Initiative Trial[1] commenced enrolling over 160,000 women (age 45-60) in 1993. 16,608 were involved in a trial taking conjugated equine oestrogen 0.625mg plus medroprogesterone acetate 2.5mg/d. This part of the trial was stopped in May 2002 after running 5.2 of its planned 8.5 years, because an interim analysis suggested that the risk of this HRT on pre determined criteria exceeded benefits (interestingly, a parallel trial using unopposed oestrogens in women post-hysterectomy is continuing). The analysis was complex. The crude results are outlined in Table 1.

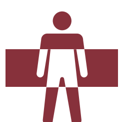
There was a significant increase in the number of coronary events in the treated group (but not related deaths), similarly there was a significant increase in stroke and venous thromboembolic disease. In the treated group, breast cancer rates showed a 26% difference (38 vs. 30 per 10,000 woman years).

Colorectal cancer was lower by almost the same number (10 vs. 16/10Kwy). These cancer changes did not quite reach statistical significance. Follow up was too short to determine a difference in cancer deaths.

The WHI is the first trial with definitive data supporting the ability of postmenopausal hormones to prevent fracture at the hip, vertebrae and other sites, with most previous trials depending on the surrogate for fractures, bone mineral density, to attest to efficacy. (Remember that there is >20% increase in mortality in the months after hip fracture). Despite this effectiveness in

Table 1.

Outcomes (n=8120)		Number of Patients Oestrogen + Progestin (n=8560)	Placebo
Coronary disease	Mean follow – up (mo)	62	61
	CHD death	33	26
	Non Fatal MI	133	96
Stroke	CABG/PTCA	183	171
	Fatal	16	13
	Non Fatal	94	59
Venous Thromboembolism	DVT	115	52
	PE	70	31
Cancer	Invasive breast	166	124
	Endometrial	22	25
	Colorectal	45	67
Fractures	Total	502	458
	Hip	44	62
	Vertebral	41	60
	Other osteoporotic	579	701
Death	Total	650	788
	Due to other cause	165	166
Global index (first event for each participant)	Total	231	218
		751	623



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fracture, the results indicate that 19 more of every 10,000 women taking HRT would experience their first of one of the events listed in Table 1 (Global index). Note that short term risks and benefits for menopausal symptoms were not addressed. The publication concludes "the substantial risks for cardiovascular disease and breast cancer must be weighed against the benefit for fracture in selecting from the available agents to prevent osteoporosis".

What effect do oestrogens have on bone density?

Increases are greater and occur for longer in the lumbar spine (2-3yr) than the hip[2], after which density is maintained at a significantly higher level than controls. The PEPI trial[3] showed an increase of bone density of 3.5% and 1.7% in the spine and hip over a three year period, vs. a loss of 1.8% and 1.7% respectively in the placebo group. These changes presumably result in a change in fracture risk as shown in the WHI trial. After ceasing HRT, bone is not lost at an accelerated rate, suggesting the benefit lasts for some time[4]. Few women lose bone whilst on HRT[5].

What other effective therapies are there?

It is likely that bisphosphonates and to a lesser extent vitamin D derivatives, are effective in reducing future fracture risk. Selective oestrogen receptor modulators (Raloxifene) have been shown to reduce the risk of fractures, and may also reduce the risk of breast cancer. They probably enhance menopausal symptoms. The above are available on the PBS (authority required-vertebral compression, or low trauma fractures). Medicare rebates are also available for confirming bone density after low-trauma fracture. Parathyroid hormone and nasal calcitonin are effective in reducing fracture risk, but not approved for this indication in Australia. Calcium supplements have been shown to slow bone loss, and should be recommended to most women.

How should osteoporosis now be treated?

Many women on HRT are now seeking medical attention on the basis of sensational media reports of this trial, and many have already ceased treatment. Clearly the continuation of HRT should be for sound medical reasons, which probably include the (relatively short-term) control of menopausal symptoms, or as a preferred prophylactic treatment for osteoporosis. The WHI trial shows that HRT is contraindicated as prophylaxis for cardiovascular disease, but reduces fractures. To warrant instituting the more active non HRT therapies for osteoporosis, the patient should be at higher than average risk of osteoporotic fracture. The lack of PBS availability for these until after the first fracture has occurred, a decision based on the structure of the original trials showing efficacy, has somewhat skewed the use of these agents as they are expensive for the patient. The best predictors of future fractures are a history of previous osteoporotic fracture, or low bone density.

What logical steps can be taken to stratify the risk for the patient?

Clearly a thorough clinical assessment should be undertaken. There are no risk factor combinations which allow the prediction of bone mineral density, and if not performed recently, then this should be performed. The Australian guidelines (consensus conference 1996) suggest that treatment should be introduced if women are osteoporotic (low trauma fractures) or have a bone mineral density 2.5SD or more below the young normal range (T score<-2.5) and that prophylaxis be strongly considered if the T score is <-1. The younger the patient, the longer they are at risk, and the more potential value there will be in treatment. We recommend that perimenopausal women have a bone density measurement to establish their risk of fracture in order that therapy may be logically considered. Note that there is no Medicare rebate for such a "screening" study, whether the patient has been on recent HRT or not.

Should women ceasing hormone replacement therapy have a bone densitometry examination?

If this has not previously been performed, and the HRT was not being administered because the patient had had low-trauma fractures, this is a good opportunity to determine the patient's relative risk, but is not reimbursable by Medicare. Item 12321 allows a Medicare rebate 12 months following a significant change in therapy for established low BMD, or low trauma fractures. If the HRT was being given for this indication, then the patient would have had a previous study, and be eligible for a reimbursed study 12 months after ceasing HRT (or commencement of a new therapy). Objective monitoring of therapy for osteoporosis is sound management.

Bone densitometry is available from our Benowa, Mermaid Beach and Tweed Heads (Wharf Street) sites. GCMI and TVR are now offering bone densitometry screening for the reduced price of $60.00 (normally $95.00).

References

1. Risks and benefits of estrogen plus progestin in healthy postmenopausal women. Principal results from the Women's Health Initiative randomized control trial. Writing Group for WHI. *JAMA* 2002;288:321

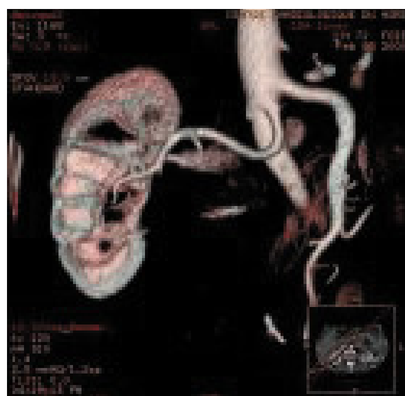
2. Changes in bone density in women starting hormone replacement therapy compared with those in women already established in hormone replacement therapy. Lees B, Pugh M et al. *Osteoporos Int* 1995;5:344-8

3. Effects of hormone therapy on bone mineral density: results from the Postmenopausal Estrogen/Progestin Interventions (PEPI) trial. Writing group for PEPI trial. *JAMA* 1996;275:1389-1396

4. Bone mass response to discontinuation of long-term hormone replacement therapy: Results from the PEPI safety follow up study. Greendale GA, Espeland M et al. *Arch Intern Med* 2002;162:665-72

5. How Many women lose bone mineral density while taking hormone replacement therapy? Results from the PEPI trial. Greendale GA, Wells B et al *Arch Intern Med* 2000;160:3065-71

Lunchtime Presentations



GCMI are currently offering GPs lunchtime presentations that are approved by the RACGP QA & CPD program for 2 points per hour. GPs can choose either of two topics or both on different days. The topics are designed to keep GPs informed regarding the technological advances in radiological diagnostic equipment to ensure optimal referral.

Topics:

1. Ultrasound Procedures Today
2. Clinical Application of Multi-Slice CT

Where:

Your surgery. GCMI will come to you. Our only requirement is a room to set up a data projector.

Time:

1 Hour

When:

Presentations are held at your convenience between the hours of 12.00 pm to 2.00 pm. For other times please discuss with Yvette.

How:

Please call Yvette Safier on 55883705 to arrange a time convenient to you.

Lunch:

Included with the presentation.

Introduction to PET

In July, Gold Coast Medical Imaging, in conjunction with Southernex Imaging Group, held an information dinner for Specialists on the Positron Emission Tomography (PET) service at the Wesley Hospital, Brisbane. Southernex Imaging Group and Gold Coast Medical Imaging are both members of the I-Med network of radiology companies.

Dr Ben Kelly and Dr David Wong, PET specialists, presented an introduction to PET and detailed the Medicare schedule rules relating to this imaging modality. The PET scanner at the Wesley Hospital has been recently upgraded to the latest generation Philips Allegro PET Camera. This scanner is the only dedicated PET camera in Queensland and is one of three private cameras in Australia that has Medicare rebate eligibility.

What is PET?

PET (Positron Emission Tomography) is a revolutionary diagnostic tool that provides diagnostic information that other imaging tests can not provide. PET works by creating powerful images of the biological functions of the human body to reveal disease states. To create these images, compounds like simple sugars (glucose, for example) are labeled with signal-emitting tracers and are injected into the patient. The scanner records the signals these tracers emit as they travel through the body and collect in the various organs targeted for examination. A computer reassembles the signals into actual images, resulting in unique pictures that show biological function processes of organs and disease.

How is PET different from other imaging modalities?

While anatomical imaging modalities like CT and MRI focus on structural detail and changes, PET evaluates the chemical and physiological changes related to metabolism. Since functional changes occur long before the structural damage is done to tissues, this is a crucial advantage that allows detection of disease well before other imaging modalities. In some instances, early detection and treatment can have a major impact on patient outcomes.

Also, a single PET scan can give information about the functioning of the entire body. This is critical in many instances, especially in Oncology where additional tumors and the spread of disease are often discovered.

What are the clinical applications of PET?

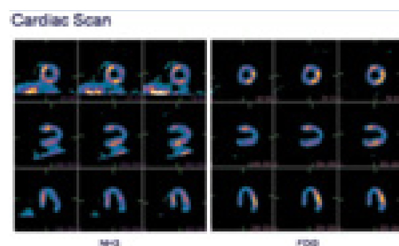
The most common application of PET are in the fields of Oncology, Cardiology and Neurology.

Oncology is the most important application of PET and provides vital diagnostic information that can alter the course of cancer treatment and sometimes help in avoiding unnecessary surgery. PET, alone or in combination with other diagnostic tests such as CT and MRI, provides critical information about whether a tumor is malignant or not, the extent of cancer, whether it has spread to other organs, monitoring of cancer recurrences and monitoring the effectiveness of treatment such as chemotherapy.

Cardiology is another important application where PET provides the highest accuracy level of any non-invasive procedure in assessing myocardial viability and diagnosing coronary artery disease.

For **Neurology,** PET provides the most accurate information to localize the areas of the brain causing epileptic seizures and to determine if surgery is an option.

Medicare Eligibility: The HIC has restricted Medicare Eligibility to Specialists referrals with very strict criteria on clinical indication eligibility. For referrers convenience, The Wesley PET Centre has developed PET specific referral forms which outline the Medicare Schedule for PET item numbers on the inside of the front cover. Please contact the Southernex booking specialists on (07) 3377 5999 for more information.



Medicare Benefits for Shoulder and Knee Ultrasound

GCMI would like to highlight changes to the Medicare Benefits Schedule as of 1 May 2003. Benefits for shoulder and knee musculoskeletal ultrasounds are payable only for the following clinical indicators. Benefits are not payable when referred for non-specific shoulder or knee pain alone.

Clinical indicators for shoulder or upper arm:

- evaluation of injury to tendon, muscle or muscle/tendon junction
- rotator cuff tear/calcification/tendinosis (biceps, subscapular, suspraspinatus, infraspinatus)
- biceps subluxation
- capsulitis and bursitis
- evaluation of mass including ganglion
- occult fracture
- acromioclavicular joint pathology

Clinical indicators for knee:

- abnormality of tendons or bursae about the knee
- meniscal cyst, popliteal fossa cyst, mass or pseudomass
- nerve entrapment, nerve or nerve sheath tumour
- injury of collateral ligaments

To ensure your patients receive the Medicare Benefits, the clinical indicators listed above must be written in the clinical notes section on the medical imaging request form.

If you would like to discuss any issues related to this matter please do not hesitate to contact our Radiologists at Southport, Treetops, The Tweed Hospital and Wharf Street, Tweed Heads clinics.

FOCUS ON CT

Godfrey Hounsfield won the Nobel Prize for Medicine in 1979.

CT, or Computed Tomography, traces it's roots to the work of an Austrian mathematician called Radon who was able to demonstrate that a three dimensional image could be reconstructed from a very large number of two dimensional images. It was not until the late 1960's and early 1970's that Hounsfield and Cormack (working independently) started to make diagnostic CT images a reality. To demonstrate how far this technology has come, in 1968 Hounsfield was able to generate a single CT image of a preserved section of Brain with a scan time of 9 hours. Today, scan times are measured in seconds rather than hours. Over time, the process of obtaining CT images was improved and in 1972, the first clinical prototype was installed in a London Hospital. Whilst the scanner could only scan Heads and the image quality was 'average' by today's standards, the scanner had a measured impact on clinical outcomes for patients.

The CT Scanner was further developed such that it could examine other areas of the body including the Chest and Abdomen. Housfield and Cormack were recognised for their contribution to Medicine with the awarding of a Nobel Prize in 1979. When giving his Nobel Lecture, Hounsfield stated that the most important feature of CT Scanning was its "enormously greater sensitivity".

Throughout the 1980's and 1990's, CT Scanners continued to evolve with the development of three dimensional images, Helical or Spiral Scanners and finally Multislice CT Scanners. Gold Coast Medical Imaging and Tweed Valley Radiology currently have three Multislice (Quad) CT Scanners at their Burleigh Waters (Treetops), Southport and Tweed Heads (Wharf Street) clinics. In addition, a Helical CT Scanner is available at The Tweed Hospital.

References:

Housnfield, G., "*Computed Medical Imaging*", Nobel lecture, 8 December 1979.

Eisenberg, R.L., "*Radiology – An Illustrated History*", Mosby, 1992, pp467-471.

TO ASSIST US IN ENSURING THE RELEVANCE OF TOPICS COVERED IN FUTURE EDITIONS OF **IMAGING UPDATE**, WE LOOK FORWARD TO YOUR FEEDBACK ON THE FOLLOWING:

1. DO YOU HAVE ANY COMMENTS RELATING TO **IMAGING UPDATE**?

2. WHAT TOPICS WOULD BE OF INTEREST TO YOU IN FUTURE EDITIONS OF **IMAGING UPDATE**?

3. WE WELCOME THE OPPORTUNITY TO SHOWCASE OUR STATE-OF-THE-ART FACILITIES. WOULD YOU LIKE US TO CONTACT YOU TO ARRANGE A TOUR AT A TIME THAT SUITS YOU? ☐ YES ☐ NO

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