

Volume 7 Number 1 February 2004  
Australasian Society for Ultrasound in Medicine

# ULTRASOUND BULLETIN

Online Clinical Ultrasound Handbook  
is up and running

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Multidisciplinary Workshop 5–6 March

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ASUM Annual Scientific Meeting  
23–26 September 2004

DMU Examination results



- Ultrasound assessment of deep vein thrombosis
- Transabdominal or transvaginal sonography for gynaecological patients
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**ULTRASOUND BULLETIN**

Official publication of  
the Australasian Society  
for Ultrasound in Medicine

**Published quarterly**

ISSN 1441-6891

Indexed by the Sociedad Iberoamericana  
de Informacion Cientificn (SIIC) Databases

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Original research, case reports, quiz cases,  
short articles, meeting reports and calendar  
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**Published on behalf of ASUM  
by Minnis Communications**

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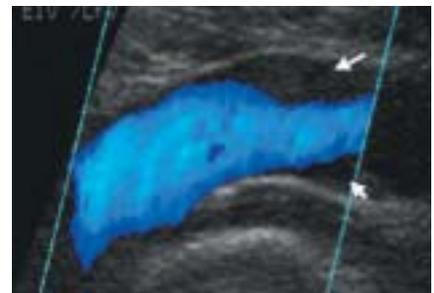
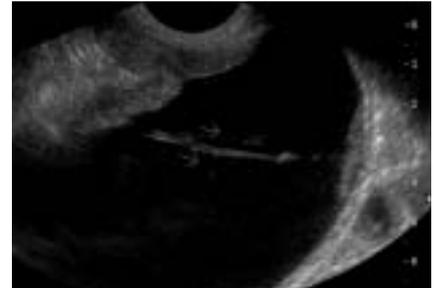
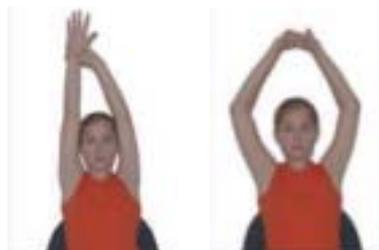


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## Notes from the Editor

This is the second issue of the Ultrasound Bulletin using the 'new look' format. Comments and suggestions are welcomed.

A wonderful new Online Ultrasound Clinical Handbook has been compiled by the Education Committee, led by David Rogers and coordinated by Keith Henderson. Readers are urged to visit the ASUM web site and add their imaging contributions to this resource – to make this site increasingly valuable as an immediate reference point for all ASUM members.

As always the Ultrasound Bulletin is packed with information intended to serve ASUM members. The Society's active role in Australia, New Zealand and Asia is evident in the reports from the President and the CEO.

Readers are encouraged to consider and respond to the Letter to the Editor on the implications of nuchal translucency screening.

This issue's scientific contributions are again practical and pertinent to clinical practice, with excellent information on deep venous thrombosis and aspects of trans-vaginal imaging.

A key article on preventative maintenance for sonographers is a 'must read' for all practicing clinicians.

New members and successful exam candidates are warmly welcomed. As always, readers are encouraged to submit their own contribution – as a letter, article or report.

**Roger Davies**  
Editor

### ASUM Online Clinical Handbook CONTRIBUTE TO WIN

An online educational resource designed to provide instant access, wherever you are, to relevant clinical information, including measurement standards, journal references and images.

Access the Online Clinical Handbook at <http://www.asum.com.au>

The best contribution received before 1 July 2004 will receive free registration to ASUM 04. A monthly prize of a bottle of wine will be awarded in each modality.

**For further information contact:**  
[education@asum.com.au](mailto:education@asum.com.au)

## President's message

*Glenn McNally*



2004 has come upon us very quickly following a short holiday season. It promises to be an eventful year and work has already commenced on several of the projects that will move ASUM into the future. I will outline these in further detail later in this message.

### New President Elect

I am pleased to announce that the President Elect for the Society is Dr David Rogers. Council at its meeting held on 29 November 2003 resolved to appoint David Rogers as President Elect. He is a radiologist working in Auckland, New Zealand. He commences duties immediately as a Member of the ASUM Executive and ASUM Finance Committee. I know

that the membership will warmly congratulate David and support him during his tenure as President.

Dr Matthew Andrews and Ms Jenifer Kidd have completed their teaching commitment as the Traveling Fellows of the Chris Kohlenberg Fellowship. ASUM has received huge praise for these two Fellows from branches where education has been brought to regional areas in Australia.

### Continuing education in the secretariat

I would like to take this opportunity to congratulate Caroline Hong for being awarded Fellow status of the Australian Institute of Company Directors after achieving the Diploma in Company Directors in September 2003. Continuing professional development for our CEO and staff is a high priority for ASUM. The ASUM Council believes that investment in our people continues to add value to the Society.

### The Asia Link Program

The ASUM Asia Link Program continues to be active in academic exchanges, fostering closer ties and cooperation between sister societies.



Glenn McNally, Caroline Hong and Andrew Ngu meet with Patrick Chia, Wee Long Lee and Raman Subramanian in Kuala Lumpur



# ASUM Meetings 2004

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# ASUM

34th Annual Scientific Meeting  
24 - 26 September 2004  
Skills Development Day  
Thursday 23 September 2004



Australian Society for Ultrasound in Medicine

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CRITICAL DATES	
Abstract Submission Deadline	Friday 1 June 2004
Abstract Presentation	17-19 September 2004
Early Bird Registration Deadline	Friday 17 July 2004
Registration Deadline	Friday 11 August 2004

<http://www.icms.com.au/asum2004>

## ASUM Multidisciplinary Workshop

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## ASUM-MSUM 2004

Kuala Lumpur, Malaysia  
Friday 5th to Saturday 6 November 2004

Joint meeting of the  
Australasian Society for Ultrasound in Medicine and  
the Malaysian Society for Ultrasound in Medicine  
Registration information will be available from April  
2004 on the ASUM website: [www.asum.com.au](http://www.asum.com.au)  
Contact: [carolinehong@asum.com.au](mailto:carolinehong@asum.com.au)

## ASUM NZ 2004

Christchurch, NZ 25-27 June 2004  
See the ASUM website: [www.asum.com.au](http://www.asum.com.au)  
Contact Rex De Ryke, email: [rdr1@xtra.co.nz](mailto:rdr1@xtra.co.nz)

## ASUM-ANZSVS 2004

Rotorua, NZ 4-8 September 2004  
See the ASUM website: [www.asum.com.au](http://www.asum.com.au)  
Contact David Ferrar, email: [vascular@clear.net.nz](mailto:vascular@clear.net.nz)

## Targeted Ultrasound Workshops

Run in conjunction with ACEM or RACS are currently  
planned for 3 April, 3 May, 31 July and 14 August  
Contact: [khenderson@asum.com.au](mailto:khenderson@asum.com.au)

The recent ASUM Asia Link Meeting held in Bangkok with the Medical Ultrasonic Society of Thailand was attended by 150 people and was another success in achieving closer ties in Asia and promoting excellence in ultrasound in the region.

Council has determined that the ASUM Asia Link Program meetings will be held in Kuala Lumpur Malaysia in 2004, in Bangkok Thailand in 2005 and in Hong Kong/Shanghai in 2006. Our ASUM CEO, Dr Caroline Hong, has already started liaising with respective countries on behalf of ASUM for an agreement to hold such joint meetings. Caroline continues to be the key contact at the ASUM Secretariat for all future ASUM Asia Link meetings.

Keith Henderson will continue to support the CEO in program coordination and planning. Dr Stan Barnett remains as the Chair of the ASUM Asia Link Program. If you wish to be placed on a special mailing list for the Asia Link meetings please email to [carolinehong@asum.com.au](mailto:carolinehong@asum.com.au) with the heading "Your name – please add to Asia Link mailing list". Stan also welcomes suggestion from membership as to how the Program may be further developed.

### DMU a Gold Standard

I am proud to announce that the DMU has been awarded full accreditation for a further five years by ASAR. The work of Margo Gill, Roslyn Savage, Lucia Pemble, Louise Morris, James Hamilton and the DMU Board of Examiners are all to be acknowledged.

ASUM continues to set the high standards for the DMU in Australia and New Zealand and is recognised as the Gold Standard by peak medical colleges. ASUM was represented by Margo Gill, Roslyn Savage, Lucia Pemble, Louise Morris, James Hamilton, Caroline Hong and myself at the meeting seeking accreditation with ASAR. The Council is extremely pleased with the outcome for its members.

### DDU and DMU in Asia

The issue of extending the DDU and the DMU to Asia has been on the Council agenda for some time. Council at its meeting on 29 November 2003 approved the creation

of DDU (Asia) and DMU (Asia). A Memorandum of Understanding and a Licensing Agreement have been signed with a private institution in Kuala Lumpur, Malaysia. The students from Asia will attend a one-year intensive course followed by examinations based on the ASUM DMU and DDU modified to suit local disease patterns.

The students will be accepted from various countries in Asia upon meeting the course entry requirements, with the first intake planned for March 2004 and the second intake proposed for September 2004. ASUM will play a key role in introducing sonography to Asia and setting and upholding the standards in sonography and diagnostic ultrasound that are well established in Australia and New Zealand. This will both directly and indirectly contribute to promoting excellence in ultrasound in the region.

Meetings and discussions will continue between ASUM and Malaysia. ASUM has also been approached with interest from the Malaysian University Medical Centre jointly with MSUM for a similar cooperative venture.

This venture is largely due to the foresight of Dr Andrew Ngu who initiated this discussion several years ago and we thank both Andrew and Caroline Hong for their efforts in bringing this idea to a successful fruition. Andrew Ngu and I will be responsible for constituting a new Board for DDU (Asia) and DMU (Asia) which will have representation from our Malaysian counterparts to be presented to the ASUM Council for approval.

### Online Handbook

Members will be pleased to know that the Education Committee has been working on a very valuable service for ASUM members in the last three years. Our thanks go to the Chair, Dr David Rogers, his committee and Keith Henderson, ASUM Education Manager, for this work.

The ASUM Online Ultrasound Clinical Handbook is now available online to all members as a ready resource to help them in their daily professional lives. Council is pleased to report that about \$50,000 has already been invested in this project which, when complete, will be a

worthy service to members and enable the maintenance of high standards of sonographic practice.

### Research fund builds

The past two years has seen ASUM be able to strategically set new directions for research and grants. Council committed funds for the first time from the surplus of the ASUM 2002 Annual Scientific Meeting to the Research and Grants Committee of \$100,000 last year. This year, we again are able to allocate \$100,000 from the ASUM 2003 ASM to the fund. In a matter of two years, we have been able to establish a solid foundation from which to build a substantial fund for research.

It is the aim of ASUM to accumulate at least \$1million in this fund in order for it to be viable resource to support worthy and substantial ongoing research projects. The ASUM Research and Grants Committee will also welcome and encourage partnership with corporate ultrasound companies for funding common projects. Fundings for the Research and Grants Committee and the ASUM Asia Link Program have been made possible due largely to the Finance Committee and the CEO in ensuring prudent management of the Society's finances.

### ASUM works with other colleges

Continuing cooperation and discussions between ASUM and other colleges in the last 12 months have led to a new series of clinician performed targeted ultrasound education and training workshops being developed for the Australasian College for Emergency Medicine, the Royal Australasian College of Surgeons and the Australian Defence Force.

Once again, thanks to Roger Davies and Keith Henderson who have put together another great issue of this Bulletin. Please feel free contact me at [president@asum.com.au](mailto:president@asum.com.au) or the CEO Caroline Hong by email at [carolinehong@asum.com.au](mailto:carolinehong@asum.com.au) if you have any questions regarding Council decisions and ASUM activities.

Best wishes,

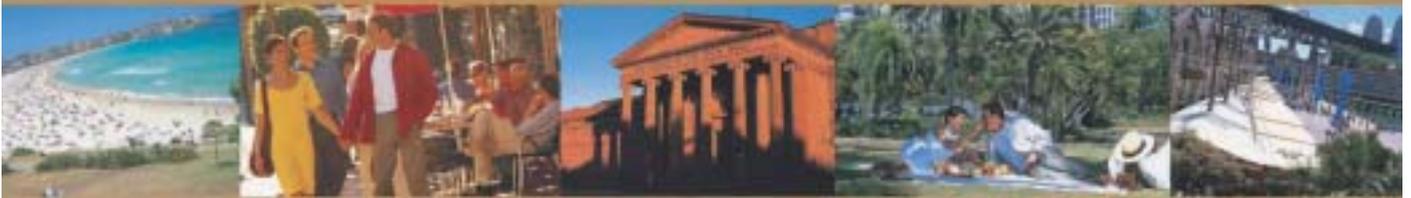
**Glenn McNally**

President

email: [president@asum.com.au](mailto:president@asum.com.au)



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24-26 September 2004

# ASUM

34th Annual Scientific Meeting

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Skills Development Day

Thursday 23 September 2004



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Ultrasound in  
Medicine

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## CRITICAL DATES

Abstract Submission Deadline	Friday 4 June 2004
Abstract Notification	6 Weeks after the Submission Closure
Early Bird Registration Deadline	Friday 23 July 2004
Accommodation Deadline	Friday 13 August 2004

<http://www.icms.com.au/asum2004>

# The CEO's desk: a busy 2004 ahead at ASUM

Caroline Hong



I hope that by the time you read this message, many of you have had a chance to rest and recharge your energy over the festive season for another great and exciting year ahead for ASUM.

The President has reported on the many activities that occupied the time and effort of the ASUM Council and Committees which kept the ASUM Secretariat staff and volunteers very busy throughout 2003. It is always very rewarding to be involved in supporting and driving the new initiatives and decisions of Council.

It is most pleasing to see the results of all the efforts and progress made in the last year, including, the ASUM Ultrasound Clinical Handbook by the Education Committee, an increase in funds for ASUM Research and Grants, the ASUM DMU achieving the Gold Standard accreditation for another five years, making progress in all of ASUM meetings and workshops and the Asia Link Program, the creation of the DMU (Asia) and DDU (Asia) and increasing liaison and cooperation with other medical colleges/ societies locally and internationally.

It is also pleasing that the ASUM Secretariat staff has fully embraced the concept of striving to achieve ISO:9001:2000 certification in Quality Management Systems for the ASUM Secretariat. In particular, I thank Keith Henderson, James Hamilton, Marie Cawood and Iris Hui for their support and contribution to

the daily smooth operational activities in the past year.

## **WFUMB – Echoes No 3 November 2003**

Members will find with this issue a complimentary copy of the WFUMB Newsletter, Echoes No 3 November 2003. This newsletter continues to be edited by Professor Soren Hancke, past Secretary of WFUMB and is distributed by ASUM on behalf of WFUMB for information and interest in the activities worldwide. ASUM is one of the six affiliated organisations of the World Federation for Ultrasound in Medicine and Biology.

## **Multidisciplinary Workshop at Conrad Jupiters Gold Coast 4-7 March 2004**

Most of you would have received the email broadcast in December 2003 from Keith Henderson, ASUM Education Manager about this meeting. Also in the last issue of the ASUM Ultrasound Bulletin, you would have received a copy of the registration form. The past year's workshop was fully subscribed very early. Please encourage your colleagues and members to register early to secure a place and to avoid any disappointment. Also, please see the website at [www.asum.com.au](http://www.asum.com.au) to download a registration form and feel free to contact the ASUM head office if you have any questions about this meeting by ringing +61 2 9958 7655 or email [asum@asum.com.au](mailto:asum@asum.com.au).

## **ISUOG 2004 Singapore 21-24 March 2004**

The ISUOG is holding its inaugural meeting of the International Scientific Meeting in Singapore on 21 to 24 March 2004 at the Raffles City Convention Centre. Group registrations forms for this meeting at a discounted fee are available through contacting the CEO by email on: [carolinehong@asum.com.au](mailto:carolinehong@asum.com.au).

## **ASUM NZ Branch Annual Scientific Meeting 24-27 June 2004**

This year, the NZ Branch will hold its Annual Scientific Meeting in Christchurch. Yvonne Taylor, Chair of the NZ Branch and her local committee have been busy with plans for another successful meeting which will be held at the Rydges Hotel.

## **ASUM 2004 Annual Scientific Meeting at Star City Sydney 23-26 September 2004**

Planning is well advanced for this meeting, to be held at Star City Hotel in Sydney, at the beautiful Darling Harbour precinct. It will not be held at the Hilton Sydney as previously announced because it is still undergoing refurbishment. Call for abstracts will be released early 2004. There will be \$100 discount off the full registration fees if your poster or abstract is accepted for the meeting.

An interesting program of world-renowned local and international speakers will certainly make this meeting another successful event. Sponsorship kits will also be ready early 2004 for interested sponsors and exhibitors. Look out for more details soon on the ASUM website at [www.asum.com.au](http://www.asum.com.au). The Convenors, Dr Glenn McNally and Jenifer Kidd have been working hard in designing a program which is interesting and attractive to ASUM members.

## **ASUM 2005 Annual Scientific Meeting Adelaide Convention Centre 28 Sept-2 Oct 2005**

Stephen Bird and his local Organising Committee are working hard already on an interesting program which will no doubt attract many people to Adelaide in 2005. ASUM Annual Scientific Meetings are now made simpler and more enjoyable for the Local Organising Committee (LOC) members because many of the headaches of minutiae and logistics are now managed by the ASUM head



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office and the professional conference organiser (ICMS Pty Ltd). The role of the LOC members will be mainly focused on the important task in designing the meeting program, sourcing speakers and deciding on the sessions. The ASUM Finance Committee and the CEO also oversee the overall financial, operational and major strategic decision making aspects of the meeting, ensuring a successful event and compliance with Council policies.

### **ASUM 2006 Annual Scientific Meeting Melbourne 21–24 September 2006**

At the Council meeting held on 29 November 2003, Council appointed Dr Andrew Edwards as Convenor, Dr Matthew Andrews with Dr Andrew Ngu as Scientific Convenors and Lisa Clarke as the Skills Day Convenor. They were appointed by Council following an expression of interest arising from the ASUM Victorian Branch, through Vicki Truelove in 2002. Planning for this meeting will commence in 2004.

### **ASUM 2007 Annual Scientific Meeting 2007**

At this stage, Cairns has expressed interest as the host city. Brisbane and New Zealand are also potential bidders for the ASUM 2007 and ASUM 2008 Annual Scientific Meetings.

### **ASUM 2009 will be hosting WFUMB 2009 in Sydney**

Mark 5–9 September 2009 in your diary and please spread the word in your all your connections and at meetings internationally. Remember to ask the CEO for sample slides if you need to include them in your lecture presentations about WFUMB 2009 World Congress when you are speaking overseas. ASUM celebrated winning this World Congress bid on 29 November 2003, following the Council meeting

with a cocktail reception recognising the contribution of supporters in winning this bid, including the Sydney Convention and Visitors Bureau, the Sydney Convention and Exhibition Centre, the NSW Department of State and Regional Development and ICMS Pty Ltd, in Sydney with about 40 guests

### **ASUM Asia Link Program**

The ASUM Asia Link Program continues to be active and has made progress. For the first time, ASUM held a joint meeting offshore with the Medical Ultrasonic Society of Thailand which was attended by 150 people. Stan Barnett, Chair of the ASUM Asia Link Program reports elsewhere in this issue about this meeting. Council has also agreed that the ASUM Asia Link Program meetings will continue and future meetings are proposed for Kuala Lumpur Malaysia in 2004, in Bangkok Thailand in 2005 and in Hong Kong/Shanghai in 2006. Planning has already commenced to initiate preparations for these future meetings in Asia. If you wish to be placed on a special mailing list for the Asia Link meetings please email to carolinehong@asum.com.au with the heading "Your name – please add to Asia Link mailing list"

### **BMUS Sonographer Exchange Program**

ASUM has agreed with the British Medical Ultrasound Society to offer an ASUM BMUS sonographer exchange program to allow ASUM sonographers to gain experience on a research project for a period of 1–2 months in the UK. The BMUS has already publicized its exchange program to fund a sonographer from UK for a research project in Australia relating to 'Work related Muscular Skeletal Disorders in Ultrasound'.

The BMUS Australian Exchange Award is a new scheme developed in collaboration with ASUM. The aim of the scheme is to sponsor a BMUS member to carry out a specified project in Australia with help and support from ASUM. For the 2004 Award, the study should be related to the subject of work related musculo-skeletal disorders in ultrasound practice. Applicants should propose a study, which will be carried out in a centre in Australia during a stay of four weeks. BMUS will expect the successful applicant to provide a report for publication in the Ultrasound Bulletin and/or presentation at the BMUS Annual Scientific Meeting.

### **Good corporate governance a priority for ASUM**

ASUM Council has agreed that good corporate governance continues to be a high priority for its governing body. Councillors are also company directors of ASUM. ASUM is registered with ASIC as a not-for-profit (more appropriately known as not for dividends) incorporated company limited by guarantee and is therefore subject to compliance with the Corporations Act. As a not-for-profit company, ASUM still has to make a surplus and this surplus is not distributed to members as dividends like for-profits organisations do. All surplus or profits generated by ASUM goes back into the Society and are utilised to fund research and projects to advance the aims and objectives of ASUM.

I take this opportunity to wish everyone all the very best for a professionally rewarding and successful 2004 and look forward to welcoming as many members as possible at ASUM meetings this year.

#### **Dr Caroline Hong**

Chief Executive Officer

email: carolinehong@asum.com.au

## **New Zealand Branch news**

For the last five years Schering (NZ) Ltd has been taking care of our video library for us. However they have asked to pass the job on. I would like to thank them very much for a job well done.

At present we have not found a replacement home for our video

library. As soon as we have one a letter will be forwarded onto all members.

This year's Annual Conference will be held in Christchurch on 24–27 of June. Any queries contact the convener Rex De Ryke, rdr1@xtra.co.nz

The NZ ASUM 2005 Conference is to be another combined conference with the NZ RANZCR. This will unfortunately clash with the DMU written exams and I would like to apologise in advance for this.

#### **Yvonne Taylor**

Chairman

NZ Branch of ASUM

# Online Ultrasound Clinical Handbook

David Rogers

## Introduction

ASUM wishes to unveil the Online Ultrasound Clinical Handbook, the culmination of over two years work by the Education Committee to produce an online educational resource that has significant clinical relevance.

In ultrasound clinical practice, when an abnormality is found, there is considerable time pressure to produce a definitive report. Often this is not immediately possible as some research is required to cover all options, especially when the ultrasound practitioner is not working in their specialty area. Suitable reference texts are not always available but most offices now have internet access.

The Online Clinical Ultrasound Handbook has been designed to provide instant access, wherever you are, to relevant clinical information, including measurement standards, journal references and images. The Online Handbook has been professionally developed to provide an easy to follow structure that presents information in an optimal format. It is very efficient with respect to download time.

## Format

Once the Home Page and disclaimer

The Ultrasound Clinical Handbook homepage



have been negotiated, the Online Handbook presents multiple options for searching for desired information. Topics of interest can be typed into a search box, glossary terms can be searched, or subject categories can be browsed.

Once an article is selected, it is displayed in a tabulated form for fast interrogation of relevant information.

Topics are relatively uniform throughout the articles and are usually as follows; summary, ultrasound features, references, differential diagnosis, images, pathology, protocol, diagnostic criteria and whole article (for printing). In addition to the above clinical guides, case studies have been inserted utilising information and images from the ASUM Image CDs.

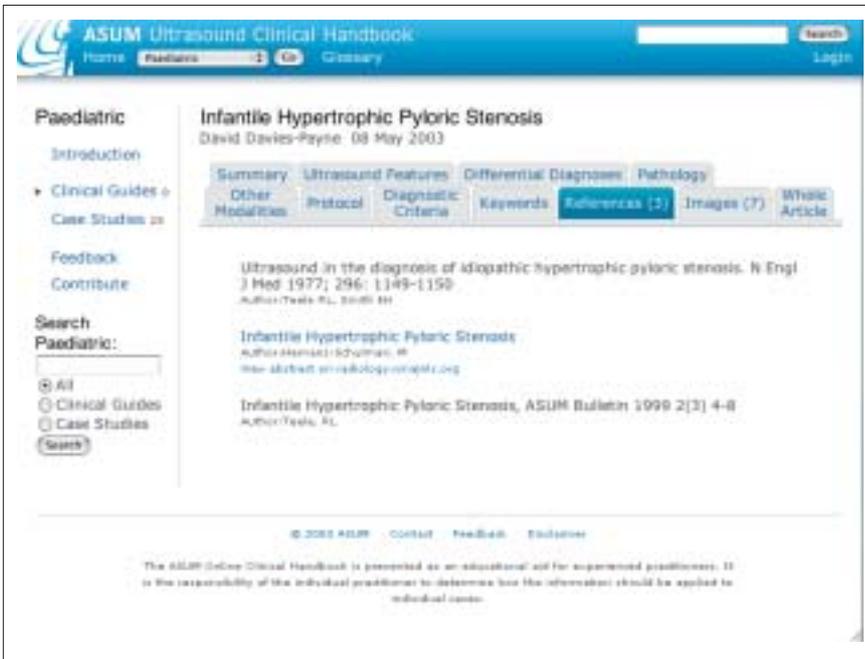
Hypertrophic pyloric stenosis page



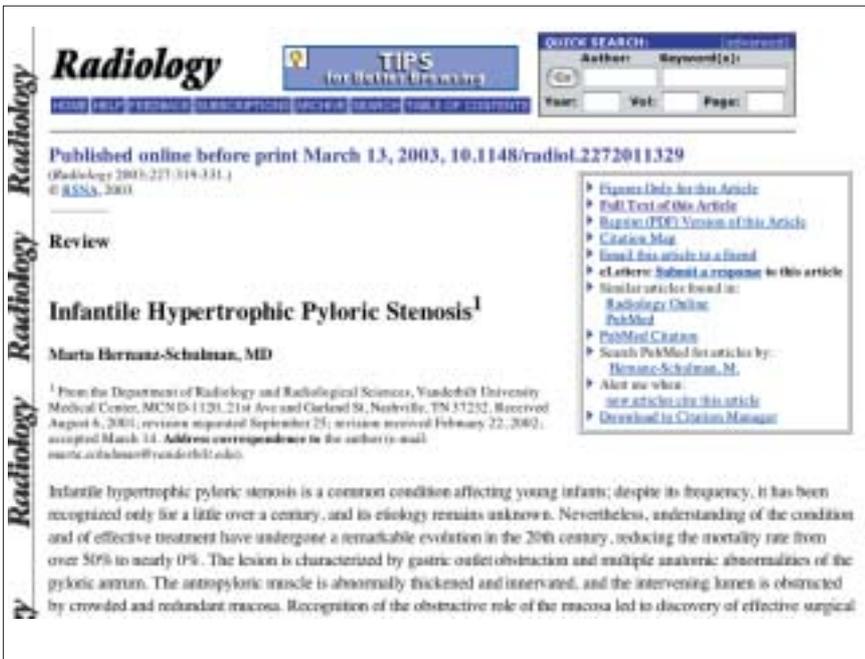
Hypertrophic pyloric stenosis image page



A sample from the Ultrasound Clinical Handbook paediatric section



The Ultrasound Clinical Handbook links to sister sites



Points to note

Images are displayed as a line of thumbnails. Clicking each thumbnail expands that image.

References are listed with hyperlinks to PubMed so that the abstract or full text article can be viewed. This will depend on whether the journal is free to view, or whether you personally have a log in password or institutional license for that site.

Tables of values eg. pyloric stenosis measurements are likely to appear in the images section.

Continuing site development

Currently the website is being made available for viewing in a relatively incomplete form. Many articles have been submitted but many more are required. It is hoped that the web site will be practically complete in September.

Contributions from sonographers and sonologists would be much appreciated. Contribution is online and there is an easy to follow registration path for contributors who can establish a portfolio of articles under construction. Once the

contributor marks the article as complete it will be automatically forwarded to the section supervisor who will edit the article and authorise it for viewing, thereby certifying the accuracy of the content.

A list of topics still required has been developed and is available for viewing on the home page for each of the site's clinical sections.

Access

There is currently free access for all to the website and it can be accessed through the ASUM web site at [www.asum.com.au](http://www.asum.com.au)

The only limitation is that independent educational institutes will be required to pay a licensing fee if this material is used in their syllabus.

Summary

The ASUM Online Clinical Handbook is nearing completion and is now viewable through the ASUM website. All members are invited to look at the Handbook and to consider contribution.

It is hoped that this resource will form a significant aid to diagnosis, not only in Australasia but internationally as well. The Handbook may also form of the backbone of an online syllabus for DMU candidates.

Acknowledgements

We wish to thank all contributors thus far who have put in a great deal of work to bring this project to practical completion.

Special mention must be made of the contribution of Professor Ron Benzie who has generously contributed the contents of the PLATYPUS Database which has substantially filled the obstetric section.

Section Editors

- David Rogers
- David Davis Payne
- Martin Necas
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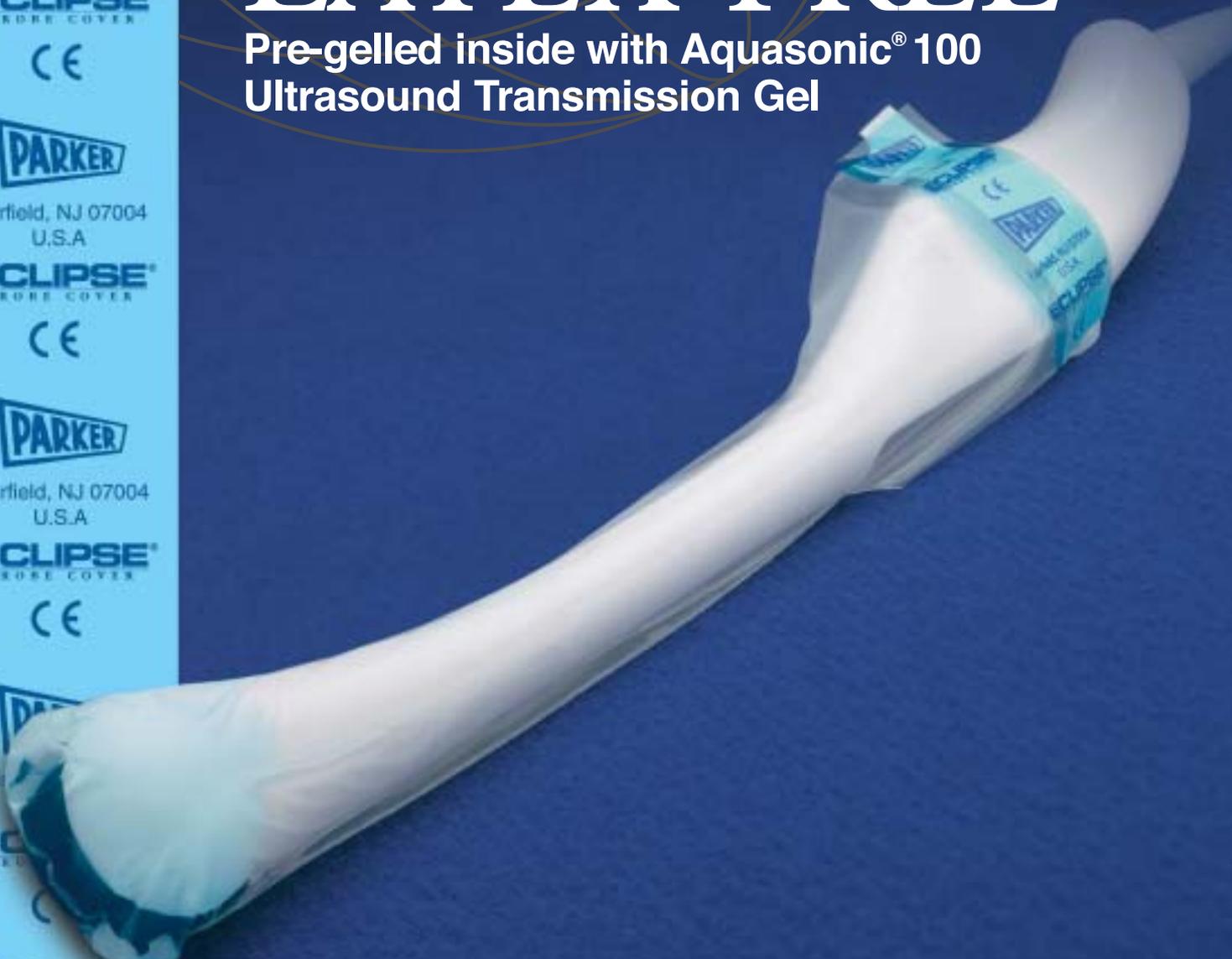


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# Letter to the Editor

## Nuchal translucency screening: a good use of health resources?

Dear Editor,

I have just read in the RANZCR College newsletter that if an MBS number is awarded for nuchal translucency screening, it must be contained within the current ultrasound budget, as no additional funding will be provided.

According to my calculations, if first trimester screening (biochemical and NT) were to replace biochemical screening at around 15 weeks in South Australia, I would have a staff member scanning full time with a good ultrasound machine for 16 months to detect one extra fetus with trisomy 21 that would be terminated.

I calculate this on the following basis. SA has a very high uptake of second-trimester serum screening. Rob Coccione from SAMSAS (the SA Maternal Serum Assessment Service) has advised me that replacing second-trimester screening with combined first-trimester screening would pick up an extra four cases of trisomy 21 per year in SA (personal communication). The delivery rate in South Australia is about 17,600 live births per year, ie. we would detect one extra case of trisomy 21 per 4400 live births.

About 90% of trisomy 21 fetuses diagnosed antenatally in SA were terminated in 2001 (SA Birth Defects Register data), so to detect one extra case which would be terminated, we would have to do nuchal translucency scans on roughly 4900 pregnancies.

**(Editor's Note:** Assuming a small non-compliance rate for nuchal translucency screening if this were funded, around three extra Downs pregnancies would be terminated each year in South Australia.)

In the public hospital service, these scans would constitute a very substantial additional workload. At 30 minutes per scan booking, say 15 scans per day, five days a week then 4900 scans at 75 scans per week would require around 65 weeks of scanning resources (equipment, staff, reporting facilities, counselling of patients about the value of the test) per fetus then aborted.

Almost all fetuses with trisomy 13 or 18, and lethally-affected XO, are flagged by the 19 week scan.

This estimate doesn't take into account the pregnancies lost between 14 weeks and term, but the message is clear enough. Nuchal translucency screening would require substantial

resources for the detection of a small number of additional abnormalities.

**Dr M Furness**

Women's and Children's Hospital  
Adelaide

### Editor's Note

In Medicare terms using the calculations supplied by Dr Furness, around 15,000 additional nuchal screening scans would be performed each year in SA, with a rebate totaling around \$1.2 million, with gap payments of perhaps a further \$300,000.

Thus about \$0.5 million would be spent to allow detection of each fetus then terminated as a result of the screening program.

Overall, the expenditure Australia wide would amount to around \$12-15 million, or something approaching 1% of the overall expenditure on imaging services. This amount could fund 15-20 additional MRI scanners for example.

Readers can decide for themselves whether nuchal translucency scanning is a good use of health resources, in the light of these 'back of the envelope' calculations.

**Dr Roger Davies**

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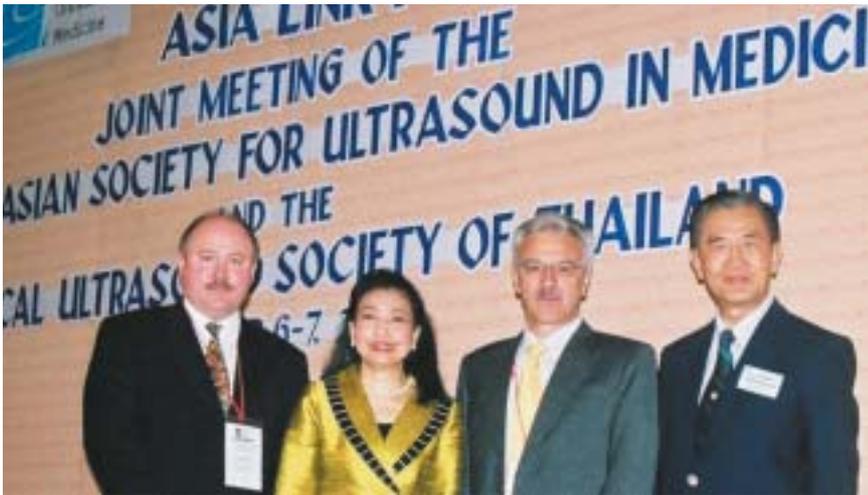
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# Link Program: first combined meeting of ASUM and the Medical Ultrasound Society of Thailand – Bangkok 2003

Stan Barnett



Organising Committee for first ASUM/MUST Asia Linkage Meeting: Dr Glenn McNally (ASUM President), Dr Laddawan Vagragupta (MUST President), Dr Stan Barnett (Asia Link Program Chair) Dr Kittipong Vairojanavong (AFSUMB President)

It is my pleasure to report on the proceedings of a landmark occasion of the combined ASUM and MUST (Medical Ultrasound Society of Thailand) meeting on medical ultrasound, held in Bangkok on 6–7 November 2003. I feel very fortunate to have been involved in this workshop to have the opportunity to promote the objectives of our ASUM Asia Link Program.

I would like to express my sincere thanks to the MUST Council and local organising committee and to all of the speakers. I believe that this meeting was most successful in attaining both educational and social interactions and that it has laid the foundation for a future productive professional association between our societies.

## The meeting

This workshop-style conference was attended by approximately 160 delegates from Thailand, Australia and elsewhere as far afield as Pakistan and Belgium. A program was prepared by ASUM with input and guidance from MUST. The Scientific Organising Committee prepared a program to



Loi Krathong float, with Mrs Nittya Vairojanavong and Professor John Harris supervising affairs

address the needs and interests of Thai and Australian delegates and included two specialties: O&G and vascular applications. After an introductory plenary session on early pregnancy Doppler, contrast agents and safety issues, the meeting proceeded with two parallel sessions.

Obstetrics and gynaecology topics included early pregnancy complications, fetal echocardiography, first trimester assessment and nuchal translucency. Vascular topics included 'Setting up a vascular lab', 'The

changing face of imaging in vascular surgery', 'Peripheral vascular disease in Thailand', 'Duplex assessment of deep venous thrombosis/ venous insufficiency' and 'Duplex follow-up of endovascular aortic stent grafts'.

Following my introductory plenary presentation on safety of diagnostic ultrasound Glenn McNally and Simon Maegher provided the lion's share of talks on O&G while Professor John Harris, Jennifer Kidd and Marsha Neumyer (kindly sponsored by Philips) gave a comprehensive series of talks in the parallel sessions for the vascular program.

MUST speakers included Dr Kittipong Vairojanavong, Dr Laddawan Vagragupta, Dr Ekachai Kovavisarach and Dr Walailak Chaiyasoot. Dr Simon Maegher developed an interactive style in which he frequently quizzed his audience that seemed to be greatly appreciated. Most of the papers were also published as proceedings of the meeting and issued to registered delegates at the time of the meeting.

The venue for the conference was the very comfortable Siam City Hotel located in the centre of Bangkok close to the sky-train and within easy reach of the World Trade Center, an essential for the shoppers.

The local arrangements were made by the MUST Organising Committee who regularly use this venue for local MUST meetings. There was ample space for parallel sessions and the larger plenary with the trade display established in close proximity. There were no posters or proffered papers. We welcomed and appreciated the attendance and sponsorship of the ultrasound trade. Platinum sponsors were Siemens and Philips, while gold sponsors were Esoate and GE. Silver sponsors were Supreme Products (Toshiba) and BJC (Aloka).



The ASUM team takes time out for sight seeing

As Chair and Co-convenor, I wish to extend my personal thanks to all speakers who enthusiastically volunteered their time to present a wide variety of lectures throughout the two-day workshop.

I am also most grateful for the opportunity to work with our professional colleagues and friends of MUST who co-organised the event, in particular Dr Laddawan Vagragupta and Dr Kittipong Vairojanavong. Thanks also to Dr Supranee, Secretary of MUST and to our CEO, Caroline Hong, who played an essential role in the overall organisational aspects with support from Keith Henderson, our Education Manager. It was quite a challenge to organise such a meeting and the successful outcome was largely due to the continued enthusiastic support by all concerned.

## Background

The concept of the Asia-Linkage Program was developed with a primary objective of creating opportunities for effective and mutually beneficial professional linkages within our geographic region to promote the best possible standards of practise in the use of diagnostic ultrasound in medicine. This initiative of ASUM is supported and shared by our colleagues in other professional ultrasound societies within the Asia-Pacific region.

The provision of proper and uniform standards of health care is a major issue. The wider availability of imaging technologies creates demands for recognised levels of training and accreditation to ensure the continued



Official presentation by MUST and ASUM Presidents Dr Laddawan Vagragupta and Dr Glenn McNally

safe and effective use of diagnostic ultrasound in medicine. The enthusiasm for cooperation in learning and optimising standards of practice was obvious from interaction with the delegates who attended the first combined meeting of ASUM and MUST.

## Cultural experience

The ASUM/ MUST combined meeting was arranged to coincide with a major cultural event known as the Loi Krathong Festival. This is probably the most romantic festival in Thailand in which people float Krathongs, or lotus-shaped vessels decorated with flowers and lit candles, as thanksgiving and worship to the Goddess of Water. The beauty and tranquility of the event exemplified the gentle, friendly nature of the Thai people. On behalf of ASUM, I would like to express our gratitude to our kind and gracious Thai hosts.

ASUM delegates took full advantage of the excellent, extremely attractive cost of tailor-made clothing. The tailors expertly assemble formal or casual wear in a couple of days. It is not even necessary to leave the hotel, as the local organising committee arranged for tailors to visit the hotel.

What is more, the process is so cost-effective that the savings on equivalent tailor-made suits in Sydney practically balance out the cost of the international air-fare to Bangkok. Of course, there is little need to mention the delights of Thai culinary experiences. Suffice to say that the Tom Yam Kung was exceptional.

Bangkok is known to Thais as 'Krungthep', or City of Angels, and was established in 1782 by King Rama I as the capital of Siam. In the centre of Bangkok, not far from the conference venue, is the exquisite Grand Palace and Wat Phra Kaeo (Temple of the Emerald Buddha). The temple houses the most beautiful and most highly revered Buddha image, carved from a single block of fine green jade. The Temple of the Emerald Buddha is said to be the repository of the spirit of the entire Thai people.

## Benefits of linkages

Benefits include the sharing of knowledge and the development of practical uniform guidelines to ensure continuing safe and effective use of diagnostic ultrasound. Quality assurance of both equipment and operator is a vital component in achieving optimum professional standards of practice.

The development of strategies to ensure uniform high practical standards will lead to improved quality assurance. The establishment of centres of training to a recognised level of competency can provide obvious benefits. There is an opportunity to enhance global education standards by providing a list of ultrasound education centres in the Asia-Pacific region and to coordinate with the objectives of the WFUMB.

While the ASUM remains a strong advocate for the WFUMB and its objectives, it is obvious that we have close geographical connections with neighbouring countries in the Asia-Pacific region. The Executive Council of ASUM has established a policy to

explore opportunities of creating mutually beneficial and effective professional linkages and to assist in education and accreditation within our region.

Our professional ultrasound societies have a common goal in establishing high standards for safe and effective use of diagnostic ultrasound in medicine. To this end ASUM has the opportunity to provide recognised accreditation through the DDU and DMU.

Within a short period of time,

ASUM has developed strong linkages and we look forward to an exciting and productive future. I believe that this is a unique opportunity for all involved to develop mutually beneficial clinical, scientific and educational activities in our geographic region.

### What next?

To take part in the ASUM/ Asia Link Program plan to attend the next offshore meeting, to be held in collaboration with the Malaysian Society for Ultrasound in Medicine (MSUM), in

Kuala Lumpur in the first week of November 2004. To plan even further ahead, please note that the ASUM/MUST combined meeting will return to Bangkok for November 2005.

These are great opportunities to update and share knowledge and awareness of ultrasound challenges in other regions while also benefiting from insight into exotic Asian cultures. I look forward to seeing you there.

**Stan Barnett**

Chair, ASUM Asia Link Program



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# Ultrasound assessment of lower limb deep vein thrombosis

KH Liu

## Introduction

Deep vein thrombosis (DVT) is a common and potentially dangerous complication of a primary illness in hospitalised patients. The condition may lead to pulmonary embolism which is either fatal or of varying degrees of clinical or sub-clinical severity.<sup>1</sup> Previous studies have shown that 90% of pulmonary embolism are due to lower extremity clot.<sup>2, 3, 4</sup> Therefore detection of lower limb DVT is important for the prevention of potentially fatal pulmonary embolism.

Besides the immediate risk of pulmonary embolism, DVT may also lead to long-term complications in the lower limbs such as chronic venous insufficiency, ulceration and trophic changes of the skin.<sup>5, 6</sup> There are many risk factors for the development of lower limb DVT, the most common and significant one is previous venous thrombosis.<sup>7</sup> Other risk factors include prolonged bed rest, postoperative state, trauma, malignancy, pregnancy, oral contraceptive use<sup>8</sup> and insertion of femoral vein catheter.<sup>9</sup>

Ultrasonography has been used for detecting lower limb DVT for approximately two decades, and its diagnostic value has well been established. However, there are still some controversies in applying ultrasound to the detection of lower limb DVT. This article will briefly review the imaging techniques and discuss these controversies.

## Clinical symptoms

The patients usually present with unilateral or bilateral lower limb swelling, tenderness, positive Homan's sign, redness or increased skin temperature of the affected limb, with or without known risk factors for DVT.<sup>10</sup>

## Instrumentation and technique

The patients lie flat on the examination couch, with the examined legs slightly flexed and externally rotated. A linear 5- or 7 MHz transducer is used, and lower-frequency transducer may be necessary for grossly edematous leg and pelvic veins. The gain setting should be adjusted so that the neighboring artery is well visualised and free of internal artefacts.<sup>8</sup>

Figure 1 Transverse scan of distal IVC. Cross section of distal IVC at the level of umbilicus is indicated by on Lt sided image and it is compressed on Rt-sided image indicated the distal crosssection of abdominal area

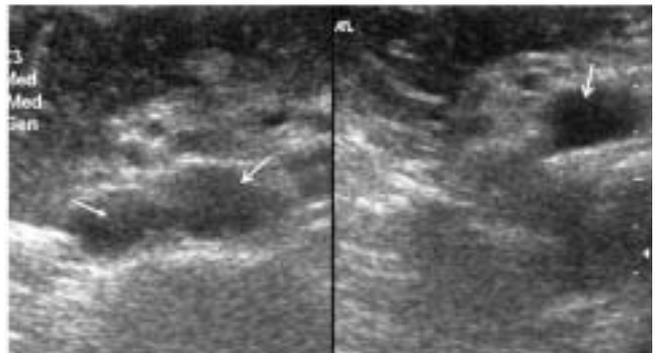
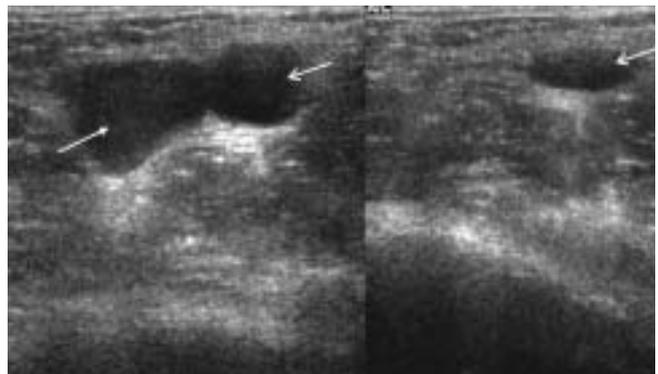


Figure 2 Transverses scan of common femoral vein. The cross section of common femoral vein is indicated by on Lt-sided image which is compressed on Rt-sided image with gentle pressure indicates common femoral artery



## IVC and iliac veins

According to the standards of the American College of Radiology and ICAVL, the lower limb venous system should be evaluated with ultrasound from the inguinal level to the popliteal fossa.<sup>11</sup> It has been shown that symptomatic patients usually have a lengthy continuous clot that often involve multiple segments.<sup>12, 13</sup>

In symptomatic patients, above-knee DVT can be detected by just evaluating from femoral to popliteal segments. However, there are some reports that in asymptomatic high risk patients, the blood clot may form focally at the sites of venous valves.<sup>14</sup>

Recently a preliminary report in our institution showed that three cases of isolated thrombus above the level of inguinal ligament were detected in symptomatic patients among 200 patients examined during the study period, which were finally diagnosed by direct contrast MR venography.<sup>15</sup> Therefore in our institution, we also examine distal inferior vena cava, common and external iliac veins in order to rule out isolated venous thrombosis above the level of

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inguinal ligament. It is understood that the pelvic veins and inferior vena cava are frequently suboptimally visualised or obscured by bowel gas.

In our experience, there are still some cases of pelvic vein thrombi being detected solely by ultrasound when visualisation is adequate. In cases where pelvic veins cannot be adequately visualised, we will address this limitation in the report. This can serve as the reminder to the referring clinicians that isolated pelvic vein thrombosis cannot be ruled out and further investigations such as contrast or MR venography should be considered. However, outcome analysis has to be performed to confirm the effectiveness of this examination protocol.

Compression technique can be applied from infrarenal IVC to the external iliac vein (Figure 1) in patients who do not have much bowel gas. In most cases, color and doppler techniques have to be used for documentation of thrombus or patency of vessels.<sup>16, 17</sup>

### Femoral and popliteal veins

Transverse scan and compression technique is performed from common femoral to popliteal veins (Figure 2). Compression is best applied with transducer transverse to the long axis of the vein so as to prevent the transducer from rolling off the vein and giving the false impression of compressibility.<sup>8</sup> This manoeuvre must be carried out along the entire length of the vein to be evaluated.

On compression, the vein will normally collapse such that the venous wall are coapted completely.<sup>8</sup> Real-time, B-mode ultrasonography with compression technique has been proved to have sensitivity (> 93%) and specificity (> 99%) in detecting above-knee DVT.<sup>18, 19, 20, 21, 22, 23</sup>

On compression alone, the diagnosis of DVT of femoro-popliteal segment can be made in most cases. In cases where diagnostic difficulties arise, color signals and Doppler spectral display can supplement the diagnosis (Figures 3–6). There are two areas which are difficult to assess by compression ultrasonography. One is the common femoral vein at the level of inguinal level where the long saphenous vein comes out.<sup>8</sup> The other one is at the adductor canal where the superficial femoral vein dives through the adductor muscles.<sup>24</sup> For these two areas, the veins are sometimes difficult to be completely compressed and in such cases color Doppler imaging can be applied.<sup>8, 24</sup>

When color Doppler imaging is used, remember to adjust the gain setting to allow the target vein to be evaluated. Usually, higher sensitivity (higher color gain and lower pulse repetition frequency) is used for demonstration of venous blood flow. If in doubt, comparison can be made with the vein on the contralateral side with the same setting.

There is controversy that compression ultrasound may dislodge loosely-attached thrombus which can embolise and cause pulmonary embolism.<sup>25</sup> There were several reports that pulmonary embolism was noted subsequent to compression ultrasonography.<sup>26, 27</sup> Given the fact that patients with above-knee DVT have clinically suspected pulmonary embolism in more than 50% of cases,<sup>28</sup> the temporal relationship of the ultrasound examination to the actual occurrence of pulmonary embolism is somewhat uncertain in these reports.<sup>25</sup> It should be noted that the risks associated with compression ultrasonography is quite low if

the sonographers take care to avoid excessive venous compression and manipulation of the vein beyond that necessary for diagnosis.<sup>25</sup>

### Calf veins

There are three pairs of deep veins in the calf, namely the peroneal, anterior and posterior tibial veins. The peroneal and posterior tibial veins are routinely evaluated to rule out calf vein thrombosis on ultrasound examination (Figures 7–10) while anterior tibial vein is optional because isolated anterior tibial vein thrombosis is rare in occurrence.<sup>29</sup> Apart from calf deep veins, there are some muscular veins embedded within the soleus and gastrocnemius muscles, which are reported to be the areas highest in incidence of thrombosis.<sup>30, 31, 32</sup>

With improved imaging technology, the visualisation of calf veins is not as difficult as it has been in the past decade. If the calf is not grossly oedematous, the calf veins can be adequately visualised. Transverse scan with compression technique of the calf veins can be performed to the whole course of posterior tibial and peroneal vein down to ankle level. If necessary, color Doppler imaging can be used. Direct evaluation of the calf veins by compression ultrasonography with color Doppler study has proved to be sensitive and specific when the examination is technically adequate.<sup>33, 34, 35</sup> It should be noted that as the blood flow in calf veins is relatively slow, spontaneous intraluminal color signal is sometimes absent. In such cases, augmentation technique is necessary to assist the color Doppler imaging.<sup>24</sup>

In our experience, when applying augmentation, it has to be made sure that the pressure is gentle and is applied directly to the vessel and just slightly inferior to the transducer, otherwise the transducer may easily slip away from target vessels and much color or Doppler artefact can be created.

There is still the argument that the calf veins should not be evaluated on lower limb venous ultrasound examination for ruling out DVT. This is because the risk of pulmonary embolism from isolated calf vein thrombosis is low and some physicians feel that anti-coagulant therapy is not warranted for the venous thrombosis isolated to calf veins.<sup>36, 37</sup> However there is another school of thought that calf examination does not only rule out DVT, but also provides additional information for the referring clinicians on other calf abnormalities such as ruptured Baker's cyst, haematoma or abscess.<sup>24</sup> Moreover isolated calf vein DVT may also cause long-term disability. A clot in the calf veins may destroy the valves, causing chronic venous insufficiency, ulceration and trophic changes of the skin.<sup>5, 6</sup> Some practitioners treat isolated calf vein thrombosis, feeling that chronic sequelae of DVT are prevented through timely and appropriate anticoagulant therapy.<sup>24</sup>

In addition, isolated calf vein thrombosis may have upward progression (popliteal vein or above) in up to 28% of cases.<sup>36, 37, 38, 39</sup> In a recently published study, pulmonary embolism was confirmed in 35% of patients with isolated calf vein thrombosis and respiratory symptoms,<sup>40</sup> so it may be advisable to examine the calf veins in routine lower limb ultrasound examination.

In cases where above-knee DVT is diagnosed on ultrasound examination, the calf vein patency

Figure 3 Colour image of superficial femoral vein. The longitudinal section of superficial femoral vein is indicated by the arrow which is filled with blue colour indicating patency of the vessel

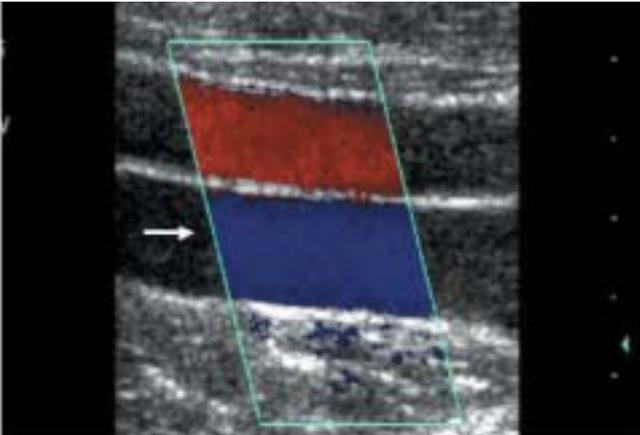


Figure 4 Acute thrombosis of common femoral vein. Hypochoic thrombi are noted distending from the common femoral and long saphenous veins indicated by the arrow with no intraluminal colour flow detected

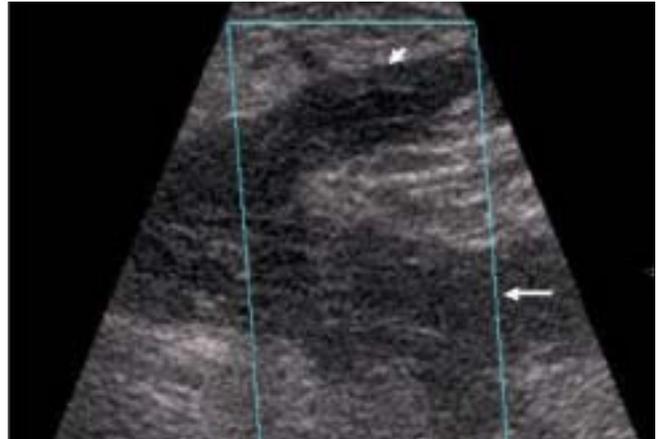


Figure 5 Non-occlusive thrombus of common femoral vein. Focal non-occlusive thrombus indicated by arrow is present at common femoral vein, with presence of colour flow within the residual lumen

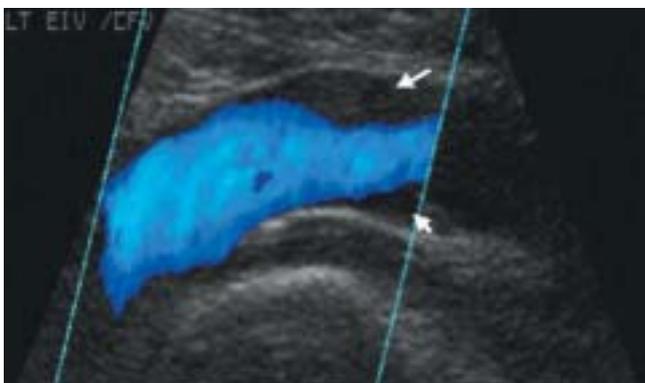


Figure 6 Partially recanalised superficial femoral vein. The previously thrombosed superficial femoral vein shows tortuous recanalised blood flow on follow-up scan

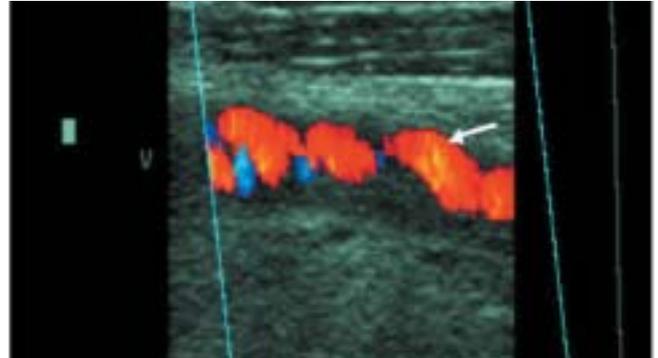


Figure 7 Transverse scan of posterior tibial vein. Cross-section of posterior tibial veins are indicated by arrow on Lt-sided image which are compressed on Rt-sided image indicates posterior tibial artery

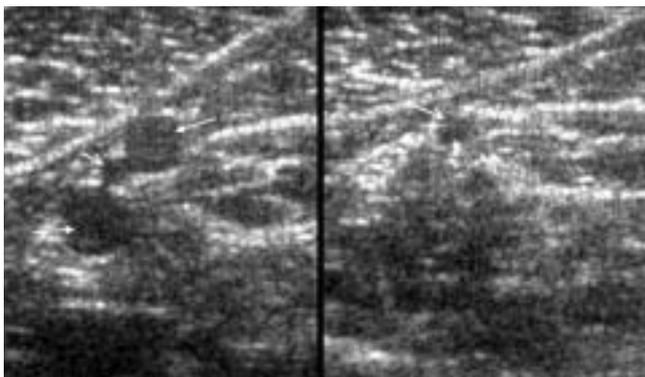


Figure 8 Transverse scan of soleal veins. Cross sections of veins within the soleal muscle are shown by arrow on Lt-sided image which are compressed on Rt-sided image

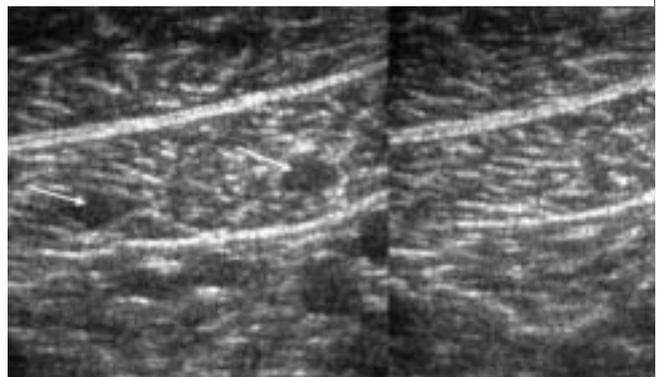


Figure 9 Thrombosis of soleal vein. Cross section of soleal vein is filled with hypochoic material indicated by an arrow on Lt-sided image, which is not compressible on Rt-sided image

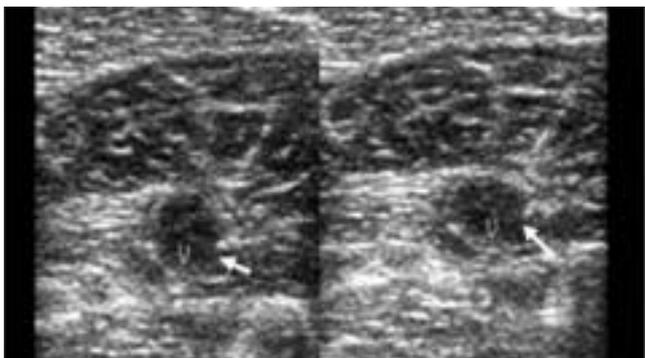
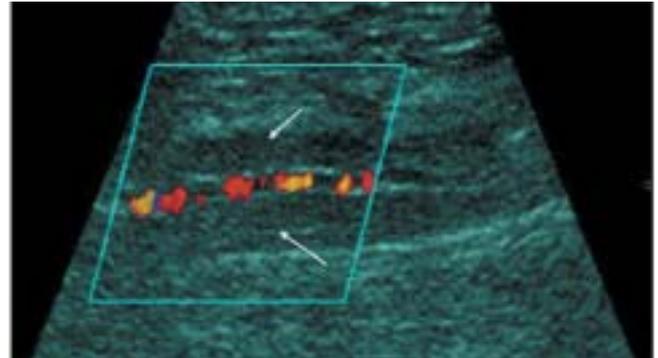


Figure 10 Thrombosis of posterior tibial veins. Longitudinal sections of the paired posterior tibial veins are filled with hypochoic thrombi indicated by arrows with absence of intraluminal colour flow



becomes less significant as treatment options remain the same.

## Summary

Lower extremity venous ultrasound examination for ruling out DVT should be performed from infrarenal IVC to the calf veins, although the visualisation is sometimes inadequate for the pelvic and calf veins. Compression ultrasound has been proved to be highly sensitive and specific in diagnosis of DVT, and color Doppler imaging can be supplemented in any case of diagnostic difficulties. Caution has to be taken to avoid excessive venous compression and manipulation of the vein beyond that necessary for diagnosis, as the low risk of dislodging thrombus during compression cannot be excluded.

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# Pelvic ultrasound for gynaecological patients: transabdominal or transvaginal sonography?

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## Introduction

Routine female pelvic ultrasonography conventionally uses the transabdominal sonography (TAS) approach. Transvaginal sonography (TVS) was first introduced in 1960, and this technique became widely used from 1980 onwards. There is still disagreement whether to use TAS or TVS as the first line diagnostic procedure after the physical pelvic examination.

There has been no report of any harmful effect caused by using either TAS or TVS, and a full pelvic scan should include the scanning of the whole uterus (from cervix to fundus), endometrial echo, the adnexa, the ovaries, any fluid in the pelvis and other pelvic mass with either or both techniques depending on the detail required by the clinical question.

## Transabdominal sonography

The patient is encouraged to drink as much water as possible to distend the urinary bladder until it extends superior to the fundus of the uterus. A full urinary bladder is essential as it acts as an acoustic window for the structures behind, straightening out the uterus to make it perpendicular to the ultrasound beam in order to get the ideal scanning plane. The full bladder also pushes away bowel gas that would otherwise hinder the visualisation of the uterus and ovaries.

The procedure should be explained to the patient. The patient lies supine on a comfortable examining table. Only the pelvis needs to be exposed for the examination. Warmth and privacy should be ensured.

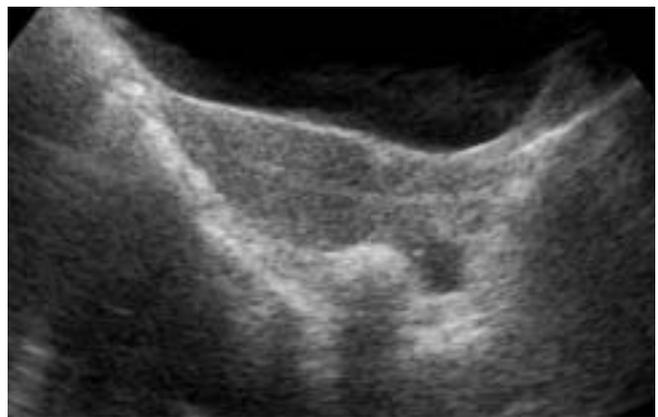
Curvilinear probes with frequency range from 3.5–5 MHz are used depending on the depth of field required and the patient habitus. The probes should be cleaned before and after use according to the guideline from the American Institute of Ultrasound in Medicine (AIUM).<sup>1</sup> An adequate amount of coupling gel is applied to the transducer or over the pelvis, according to the sonographer's preference.

Orientation of the images is as follow: in longitudinal (LS) images, the patient's head is toward the left of the screen and feet toward right side of the screen. In the transverse (TS) images, the patient's right side is displacing on the left of the screen.

The pelvis is scanned in the LS plane first by placing the probe just above the pubic symphysis. Usually oblique tilting of the probe is necessary as the uterus may be deviated to one side. Serial scans are performed in the LS planes by fanning the probe from right to left. Then the probe is turned 90° to have the TS view of the uterus. Serial scans are also performed in the TS planes by fanning the probe in a top to bottom fashion.

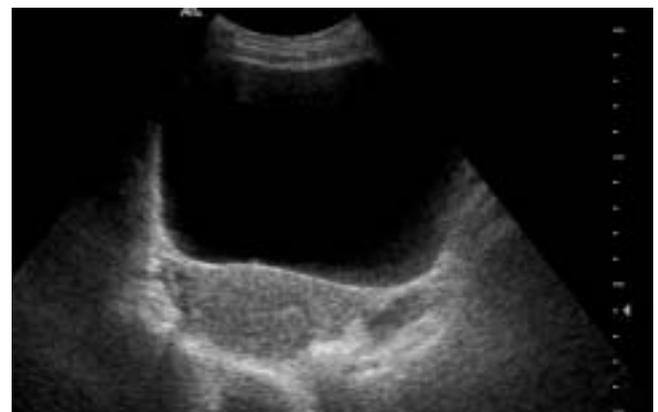
The uterus is seen with homogeneous echotexture to the myometrium with an echogenic midline echo as the endometrial interface (collapsed cavity), with a variable thickness and more echogenic endometrium depending on the physiological status (Figure 1).

**Figure 1** The appearance of the uterus in TAS



The vagina can be seen inferior to the uterus, closely related to the levator ani muscles laterally. The vagina appears as a hypoechoic structure with an echogenic midline in both LS and TS view. The ovaries can usually be found along the posterior and lateral margin of the uterus (Figure 2). However, the position of the ovaries can be very variable. They can be found in the Pouch of Douglas, close to the uterine fundus, vagina or iliac vessels, or high riding

**Figure 2** The appearance of the ovary in TAS



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in the abdomen between the bowels. Therefore careful searching of the ovary is necessary. The ovaries appear as ovoid structures characterised by the invariable presence of follicles, and sometimes luteal cysts. The fallopian tubes are usually not seen in healthy subjects, but may be obvious when there is ascites.

We should pay attention to the pelvic floor musculature since this may mimic the ovary. Two muscles are of main concern. The obturator internus is a lateral pelvic wall structure and is lateral to the corresponding ovary. The levator ani is caudal to the obturator internus and is at the level of the vaginal fornices. Ovaries will not lie below these muscles.

For the TAS, there is an increase in distance between the probes and the pelvic structures that make the use of higher frequency probes impossible. The reduction in resolution can preclude a detailed pelvic examination. For example, in obese patients and when the pelvic organs are pushed backward after an over-full urinary bladder.

One must never forget that the field of view and anatomical appreciation of structures with TAS is superior to TVS. For instance any pelvic pathology may cause ureteric obstruction and hydronephrosis. A TAS would be mandatory in looking for this, as it would be if pelvic or abdominal lymphadenopathy or metastases were suspected.

Discomfort may arise from the procedure. Patients may feel nauseated from drinking excessive amount of fluid within a short period of time. Waiting time is needed if patients have not prepared a full bladder before their appointments. However, the ultrasound machine may not be available immediately when they feel full. The feeling of holding a large amount of urine in an already overly distended bladder is stressful. Some postmenopausal women or women with large fibroid, diseased or irradiated bladders are unable to fully distend their bladders.

### **Transvaginal sonography**

The TVS technique has been widely used starting from 1980 onwards. The early application of the TVS was mainly in the following areas: in the aspiration biopsy of pelvic mass,<sup>2</sup> in pelvic abscess drainage,<sup>3</sup> in in-vitro fertilisation programs of oocyte retrieval,<sup>4</sup> in detection of ectopic pregnancy,<sup>5</sup> in detection of endometrial abnormalities,<sup>6</sup> and in evaluating postmenopausal women.<sup>7</sup>

A full explanation of the procedure to relieve any patient anxiety and obtain informed consent is mandatory. The patient's privacy must be ensured during the examination.

Scanning is done when the bladder is completely empty. Ideally, the patient is in a slight reversed-Trendelenburg position using a gynecologic examination table so that any fluid is seen in the dependent part of the pelvis which helps to outline the pelvic structures. However, in our practice, the patient lies on a flat scanning couch with a thick cushion under the buttocks. This is to ensure a full range of possible angles during manipulation of the probe. The patient is covered with a sheet and then asked to assume a frog-leg position to facilitate the insertion of the probe. The probe may be inserted by the female sonographer with only a little lifting of the sheet, thereby ensuring the patients' privacy. The insertion can also be done by the patient herself.

Where a male sonographer/ sonologist is to carry out the examination this technique ensures privacy, the female

assisting holding the positioned probe until the male can take it under the sheet. In most cultures, a female chaperone will be necessary.

The frequency of the transvaginal (TV) probe used usually ranges from 6.5-9 MHz. The TV probe is coated with coupling gel and a condom applied. Care should be taken to avoid air being trapped inside. Then another application of a suitable lubricant jelly is put over the prepared probe before inserting it into the vagina. The majority of available probes now have a fan shaped end-fire beam and resulting field of view.

During the examination, the probe is tilted in various angles, with a push and pull motion, rotation posteriorly or anteriorly or obliquely to the right or left so as to bring the probe close to the organ of interest. Sometimes a bimanual maneuver may be needed to pull the organ of interest close to the probe. This is done by gentle abdominal palpation to move ovaries close to the probe by one hand and the other hand to hold the probe. After use, the TV probe should be disinfected with antibacterial agent according to the guideline from the AIUM.<sup>8</sup>

The patient is scanned in the sagittal plane and the uterus is seen first as the midline structure (Figure 3). By main-

**Figure 3 The uterus with fibroid seen in a TVS**



taining this sagittal plane, the probe is then extended laterally to both sides to allow visualisation of the whole uterus. Sometimes, inserting the probe further in or withdrawing slightly, or severe angling of the probe anteriorly or posteriorly may be needed in accessing the fundus and cervix. To obtain the TS view, the probe is then turned 90°. By fanning the probe up and down, the whole uterus can be seen.

The ovaries can be found by turning the probe towards the lateral pelvic wall in either sagittal or TS view of the uterus (Figure 4). The internal iliac vessels can be identified and help to find the ovaries since the ovaries are usually found medial to the vessels. The ovaries are usually identified by the presence of follicles.

Orientation of the image shows different preference. Usually for the sagittal view, the uterus is displayed as cephalad structure (fundus) in the far field and caudal structure (cervix) in the near field. The bladder is seen towards the upper left of the screen. Then the cervix is displayed to the right of the bladder. For the TS view, the patient's right will be on the left side of the screen and the left being on the

**Figure 4** The ovary can be identified by the presence of follicles in a TVS



right side of the screen. Orientation during scanning with TVS is difficult as there is no external landmark available as with TAS. The sonographer has to develop a better feel for the direction that the beam is being pointed at.

The probe is now placed closest to the organ of interest and a higher frequency probe can be used to improve the axial and lateral resolution. Thus TVS can help to define the pelvic structures in greater detail and assess pathological processes of the female pelvis with a higher degree of certainty.

A TVS can also be used to detect small lesions in an obese patient, visualise atrophic uterus and ovaries in older patients and abnormalities in the retroverted uterus. For machine with colour and Doppler capability, the vascularity or flow in the uterus and ovaries can be appreciated.

Achieving a distended bladder is not necessary for TVS, and this can reduce examination time and avoid patient discomfort from retaining a full bladder. A TVS can enable visualisation of the pelvis in women who cannot fill their bladders ie. the elderly and those with diseased or irradiated bladder.

The acceptance of TVS is high, even in cultures with a stricter demand for female modesty. Cowan, Bennett et al found that the majority of women (76%) found TVS somewhat uncomfortable but almost all women were willing to undergo TVS if it were recommended.<sup>9</sup>

However, due to the high frequency of the TV probe, there is only a very short distance of field of view (6–8 cm). Any enlarged mass that lies outside the field of view of the TV probe and large pelvic mass rising outside the true pelvis cannot be appreciated. Therefore TVS may lose information that can be obtained by TAS such as lymphadenopathy, free intraperitoneal fluid and the state of the urinary tract. The detection of lymphadenopathy is crucial for the staging and treatment of cervix carcinoma.

Patient with large fibroid pose a difficult problem for TVS. The other structures may be pushed away from the focal zone of the transducer.

There is restriction of the movement of the TV probe within the confines of the vagina. TVS is not possible in patients with a small or painful introitus-virgin, atrophic or irradiated vagina or local disease. It also has limitations in paediatric patients due to the large size of the equipment.

## Other imaging techniques for the pelvis

### *Transrectal sonography*

When the patient is a virgin, or has conditions preventing vaginal access TVS cannot be used. However, transrectal approach could be used and produce similar results as the TVS.

Transrectal sonography (TRS) has been used as early as 1985 by Korzycki et al to evaluate gynecological cases.<sup>10</sup> The transrectal approach is also good for the staging of malignancy – staging of early stage cervical cancer, with recurrence located high on the pelvic wall. The positive predictive value in evaluating the parametra in women with early stage of cervical cancer by using TRS was 100%.<sup>11</sup>

### *Sonohysterography*

Sonohysterography was described first in 1988 by Deichert.<sup>12</sup> Sonohysterography is the infusion of saline (usually 10 to 20 mL) into the endometrial cavity through a catheter. Sonohysterography should be done in the proliferative phase of the menstrual cycle since intracavitary lesions can be easily seen when the endometrium is thin. This examination can provide a precise diagnosis of endometrial pathology. It can facilitate the differentiation and localisation of intracavitary and myometrial masses like polyps, submucosal fibroids and adhesions. It is also useful for the monitoring of tamoxifen therapy, and for the assessment of uterine bleeding, infertility and other subtle endometrial abnormalities which are not possible by just performing TVS or TAS.<sup>13, 14</sup>

Sonohysterosalpingography is another technique that uses a combination of air and saline during the sonohysterography to determine tubal patency.<sup>15</sup> Ultrasonic contrast agents have been used for the same purpose.<sup>14</sup> This may obviate the need for fluoroscopic hysterosalpingography.

### *Laparoscopic ultrasound*

Laparoscopic ultrasound is the visualisation of the pelvic organs during laparoscopy. The ultrasound probe has a diameter of 10 mm and the usable length of the rod is 39 cm. The frequency is 5–7.5 MHz and the probe can be bent forwards and backwards 180° manually. It is introduced through the umbilical trocar. The pelvis is filled with 300–2000 ml of saline for the transmission of ultrasound and the patient may be lying flat or in a slight Reverse-Trendelenburg position to allow pooling of fluid in the pelvis.

The probe is now directly scanning over the surface of the pelvic organs, thus allowing high-resolution images to be obtained and this augments the detection of subtle pathology. The internal aspect of ovarian cysts, myometrium, endometrium and tubal anatomy can also be more clearly defined.<sup>16</sup> This technique can provide guidance for surgery since more information can be obtained than any preoperative imaging and laparoscopic exploration.

When compared with TVS, laparoscopic ultrasound allows a more precise and superior morphologic characterisation of internal architecture and histological diagnosis of adnexal lesions (accuracy of 83.8% versus 73.5%), residual ovarian tissue (76.5% vs 59.4%) and the identification of contralateral ovary (86.2% versus 81%).<sup>17</sup> Laparoscopic

ultrasound is also highly sensitive in detecting metastatic pelvic lymph nodes in patients with cervical carcinoma (sensitivity of 91% and specificity of 100%).<sup>18</sup>

### Colour and Doppler imaging in TAS and TVS

The first use of color and Doppler in pelvic ultrasound started as early as 1988 using the TVS method.<sup>19</sup>

The colour and Doppler technique can be used to evaluate the vascularity and flow in the uterus and ovaries. The purpose of this technique is to improve the accuracy in discriminating between benign and malignant endometrial and ovarian lesions. The basis for this is that active gynecological tissues readily induce significant neovascularisation which is not only visible with flow mapping, but has a characteristic high diastolic blood flow and Doppler pattern.

Bourne et al were the first to use transvaginal color flow imaging to differentiate between primary ovarian cancer and many forms of benign pelvic masses. The absence of intratumoral neovascularisation and a high pulsatility index could be used to exclude the presence of invasive primary ovarian cancer.<sup>20</sup>

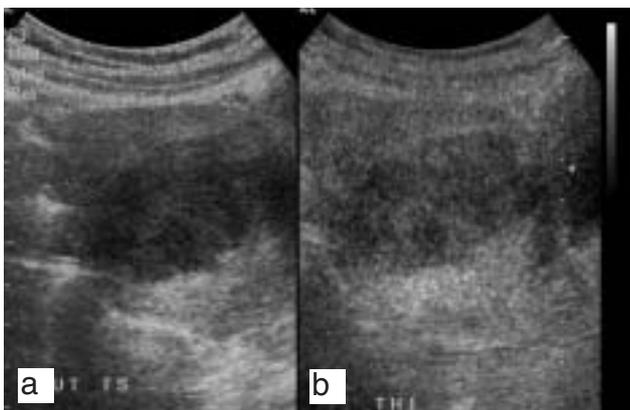
A number of studies have reported a high accuracy of using this technique to differentiate benign from malignant masses.<sup>21, 22</sup> However, there are also studies that have found this technique to be unhelpful. Alcázar et al found that the use of gray scale with the help of colour Doppler sonography still could not differentiate primary ovarian carcinomas from metastatic tumors to the ovary.<sup>23</sup> Others found that there were overlapping in the Doppler values between benign and malignant lesions.<sup>24, 25</sup>

In addition corpora lutea and ectopic pregnancies show similar hypervascular changes. The clinical situation will usually define these from possible malignancies. Colour flow imaging with TVS is essential in the diagnosis of ectopic pregnancy.<sup>26</sup>

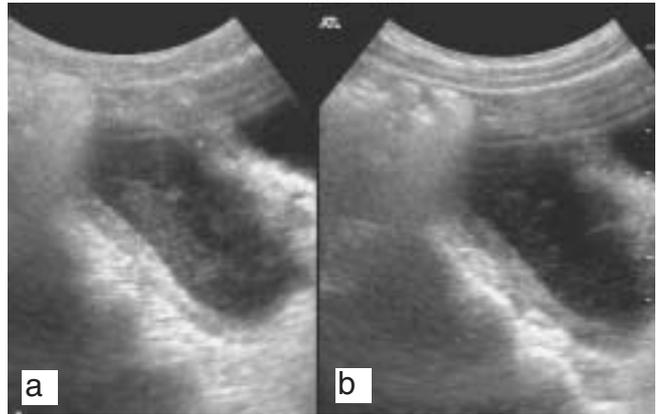
### Tissue harmonic imaging (THI)

Tissue harmonic imaging (THI) makes use of the harmonic signals normally created by an ultrasound beam to produce sonographic images (Figure 5 and Figure 6). Harmonics are generated by the tissue itself due to the nonlinear sound propagation when an ultrasound beam transmits through it. The image produced can reduce both noise and artifact, and improve in both anatomical and grayscale resolution and depth of visualisation. Tissue harmonic imaging can help to improve the image quality and conspicuity of pathology and

**Figure 5** THI can help to improve the image quality: the margin of the fibroid can be more clearly seen using the THI a) without THI b) with THI



**Figure 6** THI can help to improve the conspicuity of pathology; the low-level internal echoes in the ovary can be easily seen after switching on THI a) with THI b) without THI



thus increasing the confidence of diagnosis.<sup>27</sup>

The current application of THI in gynecology is for patients that are obese and technically difficult to image with conventional technique. THI can differentiate hypoechoic solid mass from cystic lesion. The artifact in the cyst can be better differentiated from debris, haemorrhage and septations, thus reducing the requirement for TVS.<sup>28</sup> Acoustic enhancement posterior to a cyst or shadowing from calcification in an adnexal dermoid might be seen in harmonic but not in conventional imaging. THI can improve the contrast between fibroid and the normal uterus, and will more clearly depict fibroid margin for monitoring of size following therapy.<sup>29</sup>

### Three-dimensional imaging

The advent of three-dimensional or extended field of view imaging can give a 3D depiction of the morphology and pathology of the uterus or ovaries, especially useful in the depiction of complex spatial relationships.

Alcázar et al found that three-dimensional sonography was useful for reinforcing initial diagnosis impressions of complex adnexal masses.<sup>30</sup> Both Lev-Toaff et al and Sylvestre et al found that three-dimensional sonohysterography provided additional information and allowed precise recognition and localisation of lesions.<sup>31, 32</sup>

Three-dimensional imaging of the blood vessels of tumours can help us to appreciate the geometry and continuity of arterial complexes. It can improve the visualisation of smaller vessels and flow patterns and thus provide better distinction of benign versus malignant or inflammatory masses.<sup>33</sup>

### Extended field of view imaging

Extended field of view imaging is useful for imaging and measuring large masses in their entirety, and for demonstrating the relative positions of distant targets. However, the application of extended field of view in the pelvis has limitation since the real time field of view is usually sufficiently large to document anatomic landmarks already.

Extended field of view can help to depict the relationship of a very large uterine mass with the whole of the abdomen.<sup>34</sup> Henrich et al found that the use of extended field of view with power Doppler could have the advantage of maintaining the convenience and accuracy of real time imaging while adding important anatomical perspectives;

whereas the use of power Doppler could allow simultaneous visualisation of blood perfusion in suspected tumors.<sup>35</sup>

### Techniques adopted in our institution

There are institutions that use TVS to replace TAS in gynecological examination, and TVS has become the method of choice instead of a simply being complementary method as in the past.<sup>36, 37</sup> Benacerraf et al found that in the majority (83.5%) of cases, sufficient diagnostic information can be provided by TVS alone. The use of TAS with an empty bladder was useful in around 15.1% of cases.<sup>38</sup>

Even when using TAS, there is different impression in the requirement of the degree of bladder filling. Hill et al found that a very distended urinary bladder might push the lesions of interest, the uterus or the ovaries out of view.<sup>39</sup> They suggest an empty or partially filled bladder instead of a very distended one.

Using TAS can give us a global impression of the anatomy: any enlarged uterus, high-riding pelvic masses or ovaries. The TAS technique can also give us information such as lymphadenopathy, free intraperitoneal fluid and the state of the urinary tract which cannot be obtained by the TVS.

Since TAS still has much to offer, our institution prefers to perform a TAS pelvic scan with a partially distend urinary bladder first. This can avoid the uncomfortable feeling of retaining a full bladder and compression of the normal anatomy in the pelvis by the full urinary bladder. This can also reduce the patients' waiting time and allow imaging of those who can only partially fill their bladders. Unnecessary TVS can be avoided if the information from the TAS scan is sufficient. TVS is considered as an adjunct in patients who cannot fill their bladders, where TAS cannot adequately resolve the internal architecture of the uterus, ovaries and adnexal areas. In these situations we will proceed to TVS without hesitation.

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# Transvaginal ultrasound detection of actively bleeding transitional cell carcinoma of the bladder

*Bradley J Simmons, Jacqueline F Spurway and Roger Philip Davies*

## Introduction

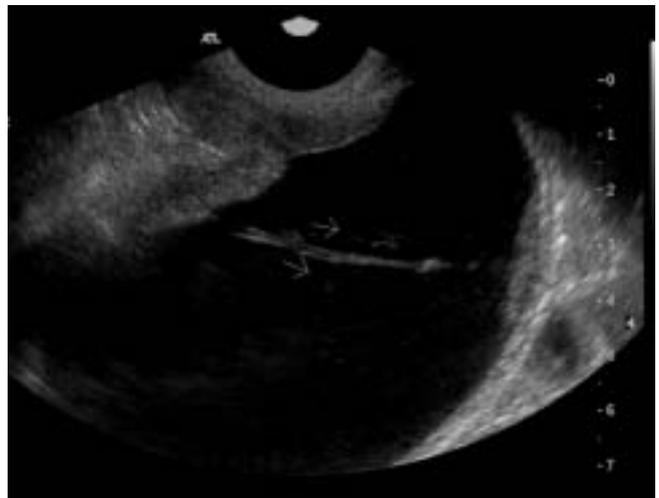
The detection of the source of haematuria remains problematic with multiple examinations including ultrasound, computed tomography, retrograde pyelography, intravenous pyelography, magnetic resonance imaging and virtual cystoscopy all employed in the investigation of this clinical problem. The number of modalities still used reflects the difficulty commonly experienced in locating the source of urinary tract bleeding. This case report describes an ultrasound based approach which can readily be introduced into clinical practice using widely available technology.

## Case report

A 69-year-old female presented with painless, macroscopic haematuria, frequency and dysuria. The past history included admission 11 months prior with haemorrhagic cystitis secondary to radiation induced inflammation of the bladder wall. The patient had undergone treatment for a carcinoma of the colon first diagnosed in 1989 with a recurrence diagnosed in 1994 treated by local resection and colostomy. A bladder carcinoma was diagnosed in 1992 treated by local diathermy and radiotherapy. More recently, there was a cerebro-vascular ischaemic event in 1997 treated by anti-coagulation with Coumadin. A hysterectomy in 1999 was complicated by a right brachial artery thrombosis. Anti-coagulant treatment had been continued since that time.

Investigation of the presenting symptom of haematuria was by renal and urinary tract ultrasound. The kidneys were unremarkable in appearance. No focal renal lesion was identified. The trans-abdominal examination of the bladder showed incomplete bladder distension with a volume of approximately 120 cc. A small amount of dependent echogenic material was evident in the bladder base. This was thought to represent blood clot from a lower tract bleeding point. However, no bladder abnormality was identified by trans-abdominal imaging to confirm a bleeding point.

**Figure 1** A focal abnormality of the anterior bladder wall was demonstrated with thickening of the wall to 10 mm. A stream of echogenic material was demonstrated flowing into the anechoic urine filled bladder lumen



Intra-cavitary ultrasound was therefore performed via the trans-vaginal route.

A focal abnormality of the anterior bladder wall was demonstrated with thickening of the wall to 10 mm. A stream of echogenic material was demonstrated flowing into the anechoic urine filled bladder lumen (Figure 1). This was thought to represent active haemorrhage from the bladder wall lesion. The stream of blood was shown pooling on the dependent wall of the bladder, as shown by trans-abdominal imaging. Anti-coagulant therapy was ceased.

A cystoscopy was performed two days later. A necrotic sessile tumour was visualised on the anterior bladder wall. Cystoscopic biopsy showed a Grade II transitional cell carcinoma invading the muscularis propria. The tumour was diathermied. An area of radiation cystitis was also demonstrated on the posterior bladder wall. Based on the trans-vaginal imaging, the anterior lesion was able to be confirmed as the source of the haematuria.

## Discussion

Transitional cell carcinoma of the bladder is the most common bladder malignancy<sup>1</sup> representing around 95% of tumours. Solid transitional cell carcinomas typically grow in an endophytic fashion in the bladder wall leading to earlier invasion and a poorer prognosis than the papillary type tumour. While demonstration of the papillary form may be accomplished by visualisation of the intra-luminal component of the tumour, sensitivity for the detection of bladder wall thickening is typically lower for all forms of imaging.

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Investigation of haematuria often includes renal tract ultrasound as a first line investigation. While trans-vaginal imaging is routinely employed in the investigation of gynaecological pathology and widely available as a result, this route is far less commonly employed in the investigation of lower urinary tract pathology. This case report demonstrates the increased sensitivity for the detection of bladder wall pathology that results from the addition of trans-vaginal to trans-abdominal imaging. The site of bleeding was confirmed, in the presence of two potential sources of bleeding.

Several reports in the literature have commented on the potential value of trans-vaginal or trans-rectal imaging in comparison with cystoscopy.<sup>1,2,3</sup> Literature reports confirm that cystoscopy and biopsy remain the 'Gold Standard' in the diagnosis of bladder tumours. Prior identification of focal lesions would be valuable in the process of triaging patients who require cystoscopic assessment. Reliable identification of focal bladder pathology might also be of value in the surveillance of patients with a prior diagnosis of transitional cell carcinoma.

Further investigation by direct comparison of trans-vaginal scanning and surveillance cystoscopy could allow the

development of a modified program of surveillance based on a combination of cystoscopic and trans-vaginal surveillance.

The appearance of active mucosal haemorrhage into the bladder lumen is not described to the author's knowledge. Consideration of the addition of trans-vaginal ultrasound is suggested where there is clinical suspicion of a lower urinary tract bleeding point and conventional imaging fails to demonstrate a site.

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## ASUM

The Australasian Society for Ultrasound in Medicine is a multidisciplinary society whose primary role is to assist in disseminating scientific information, providing education and setting standards of practice in this continually developing specialty.

Our members include medical specialists in almost all disciplines of medicine: medical doctors, sonographers, scientists, veterinarians and corporations.

The society is affiliated with the World Federation for Ultrasound in Medicine and Biology (WFUMB) and has linkages with ultrasound societies in Asia.

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### Meetings

Wednesday 2 March sponsored by HTSA

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Physics and embryology seminar 1-2 May  
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Unless otherwise stated all meetings will be held in the Radiology Tutorial room, Radiology Department, RPH.

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# Preventative maintenance for sonographers

*Ros Savage*

## Introduction

I am sure that many of us first considered ultrasound as a profession because the thought of moving heavy x-ray equipment, wearing lead aprons and carrying steel cassettes around was too physically demanding to keep up until retirement age.

With the advent of all the latest 'remote control' digital x-ray equipment and with what I now understand about performing ultrasound and how my aging body reacts to the odd positions, I am not certain that we all made a perfect choice.

There is no doubt that ultrasound is a more intellectually stimulating pastime than performing chest x-rays by the hundreds or watching a CT scanner do its thing, but physically it is much more difficult than one would think.

Undoubtedly performing ultrasound examinations can cause some musculo-skeletal and other difficulties but armed with some knowledge of the problems we can minimise the damage by doing a few simple things for ourselves.

- Firstly we must realise what problems may occur.
- Be aware of any movement or task that is uncomfortable or painful and address the problem early on.
- Keep your muscles strong and supple and they will be less susceptible to injury.
- Maintain good posture whether sitting or standing to scan and make sure you stabilise with your abdominal muscles. Core stability is vital in avoiding back pain.

When doing any exercise – either stretching or strengthening exercises, you should always be certain that you are using proper technique. I have scanned many torn calf muscles on people who swear that they stretch them regularly. Did you know that it requires totally different techniques to stretch your gastrocnemius muscle and your soleus muscle?

Lifting very heavy weights is not always the best way to improve muscle tone or strength.

Do not try to make up your own exercise program unless you know exactly what you are doing. You must always exercise your muscles in pairs so you do not end up with a strong muscle putting strain on a weaker one eg. biceps which bends the elbow and triceps which straightens the elbow.

A good gymnasium should provide training in correct technique and personal training if you feel that it is necessary. Do not be satisfied with a gym where they take your money and show you where the equipment is and leave you to your own devices. Most gyms will also have classes such as Pilates, yoga and stretch classes.

## What body parts can we harm while performing ultrasound examinations and what can we do for ourselves to avoid injury?

### Eyes

All day we alternate between staring into a screen in the half dark and staring into images on a viewing box. Your distance from the monitor may vary and affect your vision and this is something easily adjusted. You just need to pay attention and be aware of any discomfort.

Time should be taken to rest your eyes. Make sure that if you need glasses, you wear them and that you see an ophthalmologist on a regular basis to keep up with any changes in your vision. He or she will be able to advise you on how to care for your eyes.

For some preventative maintenance there are plenty of exercises to help keep the muscles around your eyes in shape.

The following exercises and figures are from website [www.stretchnow.com.au](http://www.stretchnow.com.au) (permission to publish them is acknowledged with thanks.) An extensive resource on stretching in the workplace can be found on the site in addition to the exercises shown

## Exercises – the eyes

As with all exercise, you need to listen to your body, keep the back of the neck and spine lengthened and the rib cage lifted. Remember to breathe as you work with the different exercises.

Figure 1



Figure 3



Figure 2



Figure 4



### Eye exercises

Like any other part of the body, the eye muscles need exercise. Eye exercises help keep the muscles strong and active. Also helps relieve the strain of looking at a computer screen for extended periods.

Keeping the back and neck straight and the head still, look as high as possible, and look down. Repeat this movement 10 times. Close and rest the eyes for about 30 seconds before moving to the next exercise.

Keeping the eyes wide open, look as far to the right as possible, and then to the left. Repeat this movement 10 times, close and rest the eyes for 30 seconds.

Make wide circles with your eyes by rolling them clockwise. Perform at least 10 circles. Repeat the exercise counter-clockwise. Close and relax the eyes.

### Head, neck and shoulders

The most frequent complaints I hear from sonographers is that they have a headache or a sore or stiff neck or shoulder pain. Head and neck pain often caused by the same thing

-tension in the neck and shoulder muscles from incorrect posture. This is more likely if you sit to scan. When we abduct our arm to scan, we may use the correct muscles initially but after a short time these muscles fatigue and we begin to recruit other muscles to help. One of these muscles is the upper trapezius muscle.

Being aware of this tendency to recruit other muscles, better awareness of what muscle groups we are using and correct posture can help to minimise injury. The old 'stomachs in and chests' out is very close to the mark. Stabilising with the transverses abdominus and keeping our shoulder blades down (chest out) is a large part of maintaining correct posture.

Take note if any particular movements which are uncomfortable or painful and if this persists, talk to your physiotherapists before the problem gets out of hand.

For preventative maintenance try some stretching and strengthening exercises.

The following stretches are also from the Stretchnow web site.

**Neck stretch**

Lengthens and stretches neck muscles, releases tightness due to poor posture.

a) Sit comfortably. With your shoulders relaxed and your chin towards your chest, turn your chin to the right shoulder as far as is comfortable. Do not compress the back of the neck. Hold for about 30 seconds, repeat to the other side, see Figures 5

Figure 5



Figure 6



and 6.

b) Sit comfortably, shoulders relaxed. Take your ear down towards your right shoulder, relaxing the neck as much as possible. Feel the stretch on the opposite side. Hold for about 30 seconds and release. Repeat to the other side, see Figures 7 and 8.

c) Sitting comfortably, lift the sternum and chin towards the ceiling. Allow the head to drop back as far as

Figure 7



Figure 8



is comfortable. Relax the shoulders.

Exhale, bring the head back to center, then drop the chin towards the chest, allowing the back of the neck to lengthen. Hold, release, see Figures 9 and 10.

Figure 9



Figure 10



**Exercises – the shoulders**

There are a number of exercises which help prevent computer related injury. They need to be practiced regularly to have a lasting effect.

As with all exercise, you need to listen to your body, keep the back of the neck and spine lengthened and the rib cage lifted. Remember to breathe as you work with the different exercises.

**Shoulder rolls**

Releases shoulder and neck tension and counteracts shoulders that hunch forward.

Sit on chair, feet flat on the floor. Allow the spine to lengthen.

Inhale and lift your shoulders up and back. Exhale, bring them down. Repeat 4–5 times, come back to centre

Place your hands on your shoulders, bring the elbows together in front of the chest, then up to the ceiling, back as far as possible and then down.

Feel the free movement of the shoulder blades. Repeat several times, slowly and deliberately using your full

Figure 11



Figure 12



range of movement, see Figures 11 and 12.

**Side lateral stretch**

Stretches the muscles of the spinal column by bending the spine sideways. Opens and stretches the side of the trunk.

Sit comfortably on the chair, feet flat on floor. Inhale bring arms up overhead.

Take hold of your left wrist with your right hand (Left palm is facing the right)

On your next inhalation, reach even higher through your left arm, lifting from the left armpit. Extend both sides evenly.

Exhale and bend to the right, feeling a stretch all along the left side.

Keep breathing, extending as you inhale and bending to the side as you exhale), inhale and come back to center. Repeat to the other side, see Figures 13 and 14.

Figure 13



Figure 14



**Sitting overhead shoulder stretch**

Stretches and releases muscle tension in the shoulders, upper and middle back, sides of the trunk. Sit on chair, feet parallel and flat on the floor.

Interlace your fingers in front of you, palms facing out. With your elbows bent, bring your arms up overhead. Inhale and draw your shoulders back.

Exhale and stretch your arms straight up, pressing your palms toward the ceiling.

Breathe softly and evenly. Exhale and release the arms down, see Figures 15 and 16.

Figure 15



Figure 16



# ASUM celebrates winning WFUMB 2009 World Congress for Sydney

Following the Council meeting held on 29 November 2003, ASUM hosted a cocktail at the NSW Department of State and Regional Development to celebrate and to recognise the contribution of organisations which supported ASUM in its bid to host the WFUMB 2009 in Sydney.

The function was hosted by the President, Glenn McNally and organised by Caroline Hong with the assistance of Keith Henderson, James

Hamilton, Marie Cawood and Iris Hui.

Recognition awards were presented to the Sydney Convention and Visitors Bureau, the Sydney Convention and Exhibition Centre, the NSW Department of State and Regional Development and conference management company ICMS Pty Ltd.

It was also an opportunity to present Life Member plaques to Dr Stan Barnett and Dr Dave Carpenter who

were both made Life Members at the last AGM held in September 2003 in Perth. Kaye Griffiths presented the citation.

ASUM acknowledges the sponsorship of the NSW DSRD for the beautiful breathtaking venue for the occasion.

The evening was enjoyed by all with entertainment from Johnson-Jay Medwik-Daley and photographs courtesy of Vera Hong.



# WFUMB 2009 team on camera



# The Philly experience with the Beresford BATTERY Overseas Traineeship

*Teresa Clapham*



**Philadelphia: the city of brotherly love and Teresa Clapham's destination**

I was recently given the opportunity to fulfill a lifetime goal... to travel overseas and study at a foreign university campus. ASUM and GE Medical Systems granted me the chance to achieve my goal by awarding me with the 2003 Beresford BATTERY Overseas Traineeship.

Philadelphia, the city of 'Brotherly Love' is a beautiful city rich in American History. Thomas Jefferson, America's third president wrote and signed The Declaration of Independence and it is the official home of the Liberty Bell.

It is also the home of the Jefferson Ultrasound Research and Education Institute (JUREI), a first class facility, which provides exceptional teaching in various areas of ultrasound. I attended two two-day courses, the first was on fetal echocardiography and the second was on transvaginal ultrasound.

The fetal echocardiography course was intensive and very informative. The first day was a welcomed refresher on anatomy and general scanning. The second day was more intensive involving normal and abnormal Doppler waveforms and case presentations.

Several fetal cardiologists discussed various cases and the respective outcomes for the patients, includ-



**Teresa Clapham and Dr Barry Goldberg – one of the world's leading lights in ultrasound**

ing drug treatments and surgical intervention.

There were many videos of abnormal cases and a fantastic course handbook that I refer to often.

It was great to talk to many radiologists, sonographers and obstetricians about various scanning techniques that they used in their workplace. It was reassuring to know that the Australian standard of scanning fetal hearts is exceptionally high and we all deserve a pat on the back for our consistent

efforts in increasing our knowledge in this critical area.

The second course was on the following weekend, so I was able to travel to New York for Halloween, which was quite an experience. I went on an organised tour around the eastern triangle where I visited Niagara Falls, Toronto, Washington DC and then back to Philadelphia.

The transvaginal course was also excellent and included a practical component.

It covered the basics in transvaginal ultrasound, normal/ abnormal pathology, infertility, pelvic pain, the postmenopausal pelvis, first trimester scanning including ectopic pregnancies

and sonohysterography. The course was a great refresher, and I appreciated the numerous case studies and abnormal images shown during the lectures.

JUREI also offer other courses such as Principles of Ob/Gyn Ultrasound, Obstetrics and Gynecology ultrasound-Core and 3D/4D ultrasound in Ob/ Gyn.

I was extremely fortunate to meet Dr Barry Goldberg, the Institute Director and an icon in the ultrasound

world. It was an honour to meet such an incredible person after reading many of his journal articles and text-book articles.

While I was in Philadelphia, Dr Goldberg received an achievement award from Dr Beryl Benacerraf, Harvard Medical University. Dr Benacerraf gave two lectures, one on trisomy 21 markers and the other on 3D in obstetrics and gynecology. This was definitely a highlight of my trip, as I had researched many of her articles as a student and throughout the course of my continuing professional development.

It was also astounding to discover that everything she had discussed in her 3D in obstetrics and gynecology lecture, we are doing in my own workplace with Dr Gary Pritchard at Brisbane Ultrasound for Women. She discussed the potential of volume data set manipulation, which we are actually performing.

It took me a trip across the world to realise that we in Australia are also at the forefront of technology and we have many professionals in our own backyard who have an incredible knowledge which we should take advantage of. It made me proud to be an Australian sonographer, knowing that our knowledge and standards are up there with the world's leaders.

I would strongly encourage people



Teresa Clapham and the Liberty Bell

to apply for the Beresford BATTERY Overseas Traineeship; it was an incredible experience. The courses are very well run, and I would recommend anyone in the early stages of their career who wants to enhance their knowledge, to apply for the traineeship. You don't have to work in a dedicated obstetrics and gynecology practice – but it helps if you have a passion for it. A big thank you goes to ASUM

and GE Medical Systems for providing me with this experience, especially Keith Henderson and Tsui Min Lian who helped me in the organisation of my trip. Katie James from JUREI helped me tremendously, and it was great to meet her in person after countless emails.

Last but not least, thanks to Gary Pritchard and Margo Gill for their encouragement and confidence in me.

## Toshiba ships 150,000th ultrasound unit

Toshiba passed a milestone on 9 January when the Company dispatched its 150,000th ultrasound unit. Rosina Davies, General Manager Toshiba Australia Pty Limited, Medical Division, said: "Ultrasound now covers diagnosis in nearly all speciality areas.

"Toshiba Australia has been providing diagnostic ultrasound sales and service in Australia and the Asia Pacific region for over 20 years."

Its prototype system was developed at Toshiba's Research Laboratory (currently Toshiba Research Development Center) in 1975, and the world's first linear electronic scanning ultrasound system SSL-53H was launched in 1976. This system received the Japan Prime Minister's Award in 1995.

In the beginning, ultrasound systems were used in the diagnosis of disease/ abnormalities of abdominal organs, and obstetrics and gynecology for fetal growth. By the mid 1980s, color Doppler systems for imaging blood flow were in broad clinical use for cardiac and vascular applications.

Toshiba's technical development and research focus is on both B/W and color Doppler systems. The technologies used in the development of these products received the Japan Science Ministry Award in 2003.

"By meeting with our customer's worldwide and listening to their needs and ideas, we incorporated this information in our development; in November 1996 we were the first in the world to achieve shipment of 100,000 units, 20 years after our first

ultrasound system was shipped. We have achieved a further 50,000 units shipped since then, for a total of 150,000 units shipped as of January 2004," Ms Davies added.

Ultrasound is one of Toshiba's best businesses, in part through the stable sales in Aplio™ and Nemio™ multipurpose with fully-digital systems, launched in the Japanese market in 2001.

Nemio™, the company's premium compact system, has reached a total of 8000 units in production since its introduction in March 2001.

The architecture of Toshiba's ultrasound systems allows sharing of information in combination with CT or MRI systems and the ability to display all images on a network for comparison.

# HMAS Angiographic: a sinking ship

*Eric Yeomans*

Angiography has always fascinated me. I remember as a student watching in awe as my chief radiographer deftly hauled cassettes from a manual film changer in compliance to a radiologist screaming:

“SHOOT! . . . SHOOT! . . . SHOOT! and . . . . . SHOOT!”

Later in my career, I paid a similar awe to the mechano-electronic genius of fast film changers – AOT, PUCK – and various multiple cassette devices, and currently, I stand awestruck to the cyber brilliance of DSA.

I must say though, that when considering the latter modality, a wistfulness comes over me, in sympathy to the analogue modem that it has displaced. Those magnificent vessels that once sailed the cutting edge of medical imaging – grand, superb, majestic – are now jettisoned to rust away in some radiologic backwater. I sound like an old sea captain reminiscing the days of yore. What’s that you say, Maudlin – Who me?

I use the naval analogy, as it is an angiographic battleship – the long leg changer – that this story concerns. Long leg changers were the heavy-weights of angiographic changers. Huge, cumbersome pieces of equipment, loaded with half a dozen large cassettes (180 cm long), strapped to the sides of a hexagonal barrel. A ‘run’ involved the synchronic presentation of a new cassette for each exposure of the x-ray tube (usually situated in the ceiling of the angio room). The rumbling thunder this action produced, reinforces my analogy:

The captain moves his vessel to battle position,

The radiologist places catheter into artery,

Sailors stand ready in assigned positions,

Radiologists, nurses and radiographers do their final checks,

An opening shot is put across the bows,

The injector pump fires,

Battle is engaged – cannons fired, shells ejected, reloaded, fired again.

X-ray tube exposes, film drum rotates, exposure clock ticks away . . .and so on and so on.

The battleship of our department was usually docked in the storeroom. The tight confines of our general purpose screening room made its standing deployment impossible. When needed it was manoeuvred into a tight mooring by numerous tug vessels called porters, nurses and radiographers.

## The man didn’t make a sound, just sat staring at us in shock

HMAS Longleg allowed free access on only one side to load cassettes. The opposite side had a 60 cm space between it and wall. The proximal section was coupled firmly to fluoroscopy table and the distal gave another 60 cm space before the door to the fluoroscopy room toilet.

The angio so far had progressed well and main run was imminent, when the scrub nurse noted that the injector had not been filled with contrast. To remedy this involved a complex operation between scrub nurse and me in the space between wall and changer, (where the injector was normally situated). As we neared the completion of our task – we were checking the syringe for bubbles – the ceiling x-ray tube could be heard revving to exposure potential. A compatriot, under pressure from a concerned radiologist who saw blood seeping from the patient’s groin, had initialised the run.

“Hey!” both nurse and I protested in unison.

“Don’t worry,” shouted my colleague over the penultimate whine of spinning anode, just duck into the toilet, you’ll be right.”

Nurse and I exchanged glances and without speaking charged into the toilet. I slammed the door closed as buzzer indicated the first exposure.

“That was close”, I said looking over to the nurse.

“Yeah but...” she gestured with a sideways nod of the head. I looked to the back wall to see an elderly gentleman seated on the toilet – toilet paper in hand, trousers crumpled around his ankles. The screening room water closet also served the medical imaging department’s main waiting room (entrance obtained through a second door).

The man didn’t make a sound, just sat staring at us in shock. The nurse and I stood silently, looking into each other’s eyes. What could you say? What could you do? The angio could be heard in full battle through the toilet door – cannons fired, shells ejected, reloaded – it went on for over 40 seconds, it seemed like hours.

Mercifully the last exposure sounded and nurse bounded out of the toilet with a greater gusto than she had charged in. I stood at the door for a second, looked over my shoulder and said, “Sorry mate”. The man’s expression had not changed. He still made no sound, in fact he held the same piece of toilet paper in his hand that he had at the beginning of our intrusion – unmoved. As I stepped out of the toilet my suppressed laughter gushed out in harmony to that of the nurse. My radiographic colleague looked at us bewildered. “Remind me to talk to the boss about the toilet door locks,” I said.

The man in the toilet preserved his silence – no complaint ever reached the chief radiographer – and beyond imbedding itself into departmental legend, the episode was not commented on further. I feel however, that the incident could provide a fitting epitaph to the era of analogue angiography. It would be difficult to imagine that digital modem with their cold efficiency have the room for such basic human relations.

Maudlin? Not me.

**Eric Yeomans**  
Senior Sonographer

# Book review

## Ultrasound and Endoscopic Surgery in Obstetric and Gynaecology – a combined approach to diagnosis and treatment

Editors Timmermand, Deprest J and Bourn T  
 Publisher Springer-Verlag 2003

This book will be of particular use to those practising largely in the area of gynaecologic imaging, particularly gynaecological ultrasound.

The past 20 years has seen a transformation in gynaecologic practice. Gynaecology has changed from being a largely surgical discipline to being a significantly medical discipline. This is underpinned by improvements in diagnosis, particularly that provided by diagnostic ultrasound.

The book's information is weighted toward describing a great number of minimally invasive procedures now commonly practised. As such, the book is very useful for the practising gynaecologist with an interest in diagnostic ultrasound. The converse is no less true, however.

For those of us practising, it is very useful to keep up with the pace of development of new surgical techniques and gynaecologic pathology. A knowledge of surgical techniques is of course essential if the reports provided by imaging specialists are to be clinically useful and provide the referrer with information that helps better manage patients.

The book is conveniently divided into sections relating to clinical problems including menorrhagia and its management, the postmenopausal patient, urogynaecology, the assessment of ovarian masses and their management, endometriosis, infertility and early pregnancy complications.

There is also a useful section covering prenatal diagnosis and the fascinating topic of obstetric endoscopy. Each clinical section has a different weighting of imaging and description of surgical management. For instance, ultrasound in menorrhagia is well cov-

ered and the list of surgical procedures covered is extensive and includes hysteroscopy, hysteroscopic fibroid resection, endometrial resection, laparoscopic hysterectomy and vaginal hysterectomy.

For those primarily interested in ultrasound, the book's content is probably too heavily weighed towards surgical procedures, however it is generally well written and manages to retain the reader's interest.

The information relating to three dimensional ultrasound, concerning its use in assessing congenital uterine abnormalities, is minimal.

Perhaps the book's most obvious weakness is its limited assessment of the role of magnetic resonance imaging (MRI) as adjunct to diagnostic ultrasound. MRI will probably assume

a greater role in imaging many gynaecologic pathologies and assisting better planned management, so it is a little disappointing to see fairly limited reference to it.

The quality of the images contained within the book was generally adequate and the laparoscopic and hysteroscopic images are generally excellent.

In summary, this is an excellent book for both practising gynaecologists with an interest in ultrasound and diagnostic ultrasound specialists practising largely in the area of gynaecologic imaging. As such the book is not for everyone but for its niche market would be a very useful addition to the book shelf.

Glenn McNally

## FOR SALE

### Philips HDI 5000 Ultrasound Machine General Cardiac and Vascular

Type: General Vascular, Cardiac & Obstetric packages. Web link upgraded

Condition: Excellent

Transducers: L7-5, L10-5, C4-2, CW probe

### Available now

Service History: Upgraded to highest platform with regular services.

Accessories: Sony Colour Printer, Integrated Video recorder, Foot switch, Polaroid 35mm Slide maker. Fully fitted cover,

This machine is in excellent condition and would suit a general or vascular workplace.

Reason for sale: replaced with a 5000 HDI

Contact: Claire Johnston PhD

Traralgon Victoria

tel 031 4441 001

mo 031 410 000

Price: POA

## VASCULAR SONOGRAPHY

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for part time work

Can get time off for holiday relief

VASAR registered excellent references Reasonable rates

hot agency

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# Venous Incompetence

# WORKSHEET

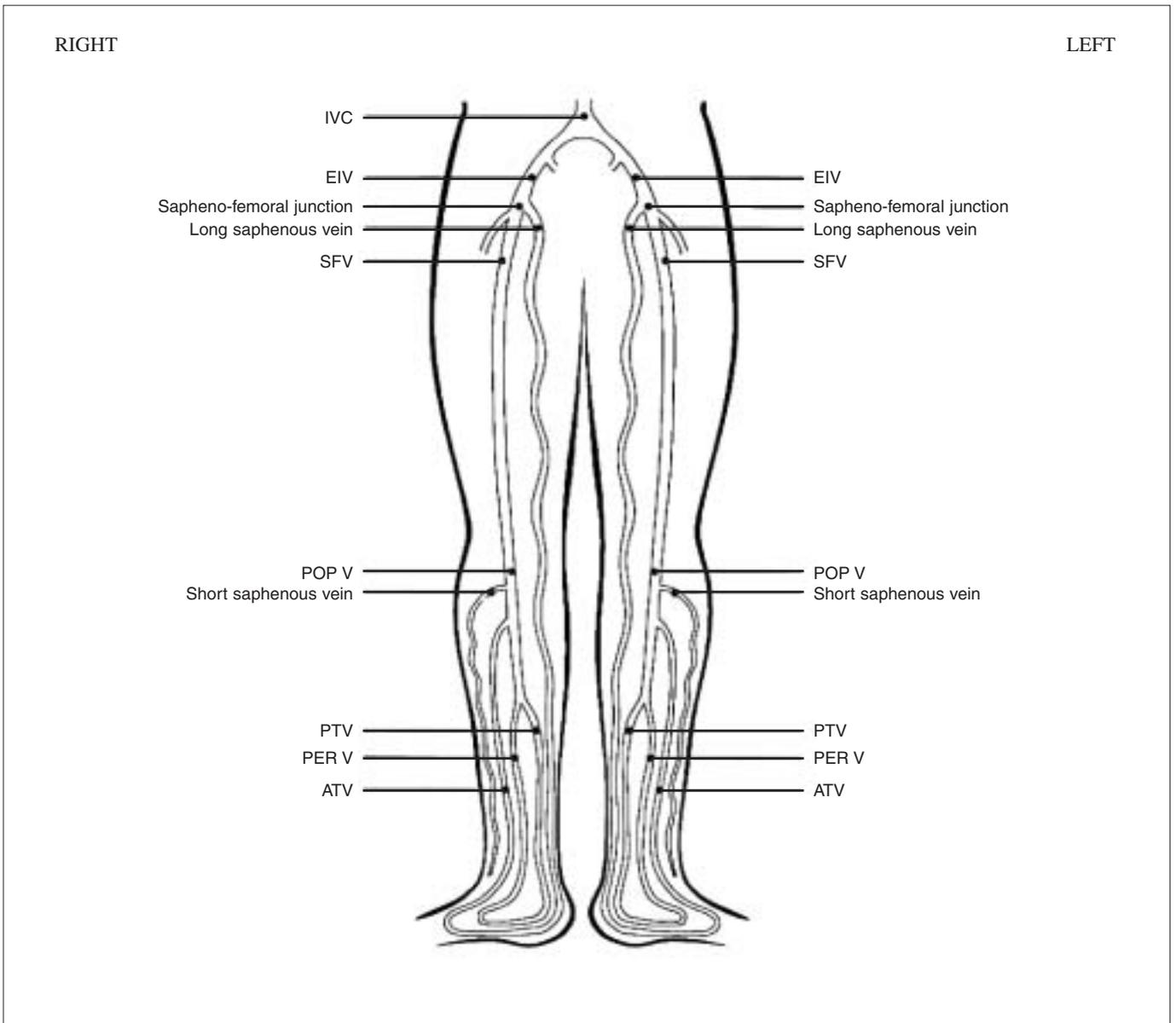
SONOGRAPHER		
PATIENT NAME		
SONOLOGIST		EPISODE/Accession No
Date...../...../200.....	DOB...../...../.....	MRN/URN

INDICATIONS for study

MARK each visualized location as follows:

C=Competent                      I= Incompetent (reversed flow)                      O=Occluded

Draw all perforating branches identified on diagram



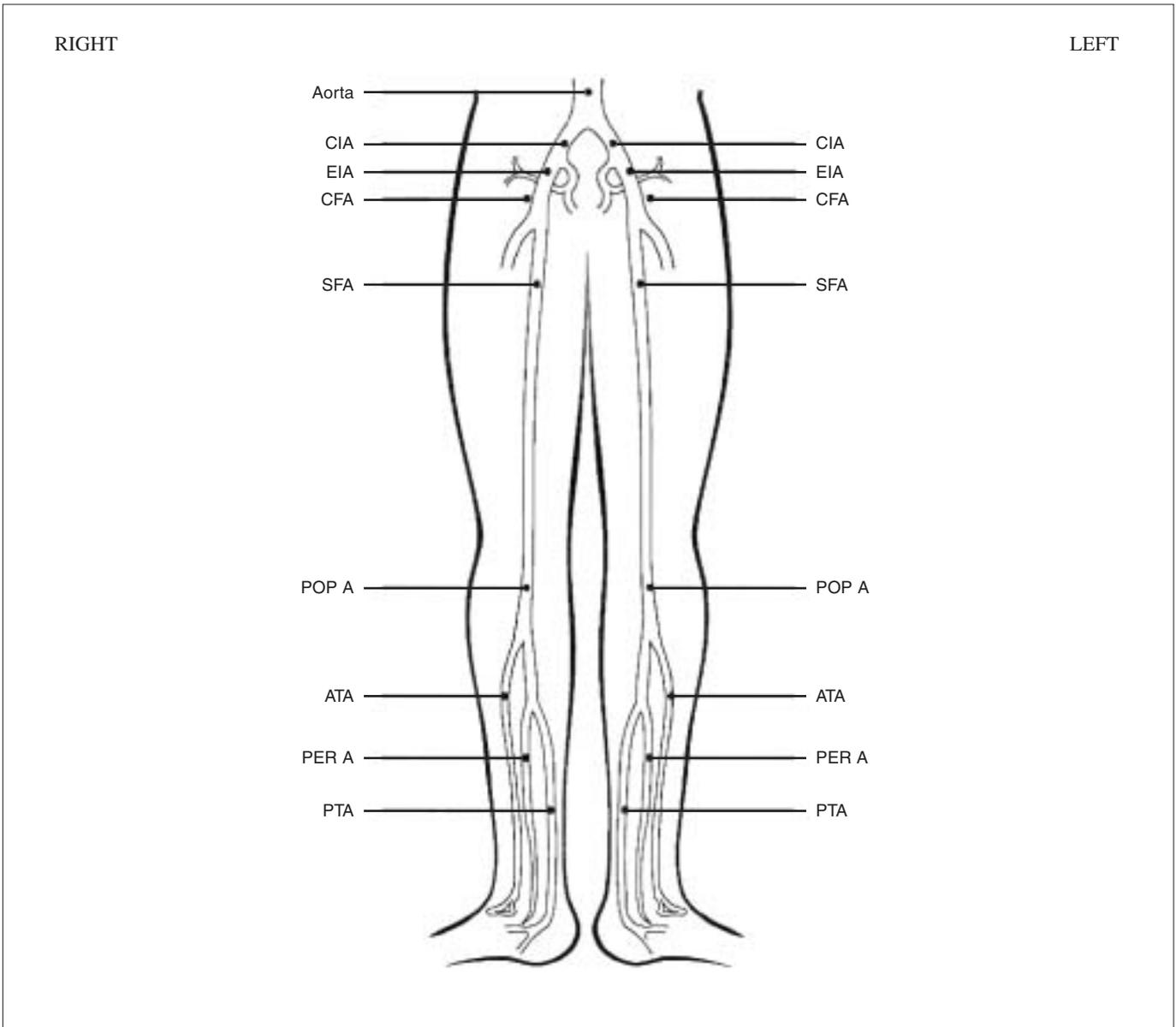
FINDINGS


# Leg Arteries

# WORKSHEET

SONOGRAPHER		
PATIENT NAME		
SONOLOGIST		EPISODE/Accession No
Date...../...../200.....	DOB...../...../.....	MRN/URN

INDICATIONS for study		
Mark Velocities (PSV/EDV) where measured	ABI Right	Left



FINDINGS
WAVEFORM CHANGES
OTHER

# IMPORTANT DMU information for 2004

2004 DMU Handbooks were posted on the ASUM website in early December, following the DMU Board of Examiners Meeting. Note there are changes to the Syllabi, Reading Lists and Regulations.

DMU Examination Fees are unchanged from 2003.

## Examination dates 2004

Part I and II Written  
Examinations  
Saturday 31 July

Part II Objective & Standardised  
Clinical Examinations (OSCEs) and  
Oral Examinations (See Footnote 2):

Cardiac  
Saturday 16 October  
General  
Saturday 23 October  
Obstetric  
Saturday 23 October  
Vascular  
Saturday 16 October

Part II Practical Examinations  
Completed between August to  
October.

### Footnote 1

Australian Trainee Sonographers are required to register annually with the Australasian Sonographers' Accreditation Registry (ASAR). Candidates applying to sit either the DMU Part I or DMU Part II Examinations DO NOT need to apply for ASUM Student Status since acceptance to sit the DMU Examinations includes Student Status.

Examination candidates need only submit their ASUM DMU Examination Acceptance letter, together with their ASAR application and registration fee to the ASAR in order to secure their 2004 ASAR registration. For further information and ASAR application material please visit the ASAR website (<http://www.asar.com.au>)

New Zealand Sonographers are required to register annually with the

Medical Radiation Technology Board (MRTB) to practice. Trainee sonographers wishing to practice in New Zealand while undergoing training are, therefore, required to apply to the MRTB to be considered for an exemption to practice.

Exemption Application Forms are available from:

The Board Secretary  
Medical Radiation Technology  
Board  
PO Box 10 – 140  
Wellington, New Zealand

### Footnote 2

The DMU Board of Examiners will determine the locations for the OSCEs and Oral Examinations once the final candidate numbers, venue availability and Examiner requirements are known. Candidates are also reminded that while the dates for the OSCE/ Oral Examinations are fixed, all modalities will not necessarily be examined at every centre.

## DDU exam dates and fees 2004

### Part I Examination Fee

A\$990.00 (includes GST) for ASUM  
Members A\$1,254.00 (includes GST)  
for Non members

### Part II Examination Fee

\$A1,760.00 (includes GST) for  
ASUM Members \$A2,024.00  
(includes GST) for Non members

### Part II Casebook Fee

\$A330.00 (includes GST)

Application forms may be downloaded from our website [www.asum.com.au](http://www.asum.com.au)

Fees quoted above are from July 1 2002 and may be subject to change.

### Information pertaining to the next examinations

2004 Part I The Part I Examinations for 2004 will be held on Monday 17 May 2004 with applications closing

on Monday 22 March 2004.

2004 Part II Casebooks for 2004 Part II DDU Examination must be submitted by Monday 19 January 2004 and accompanied by the prescribed fee of A\$330.00 for all participants.

The Written Examination for Part II will be held on Monday 17 May 2004 with the closing date being Monday 22 March 2004.

The Oral Examination for Part II will be held on Saturday 19 June 2004 in Sydney. The Oral Exam for Cardiology candidates will be in Melbourne on Thursday 17 June 2004.

### Results

Examination results will be mailed to candidates early July following the DDU Board of Examiners meeting.

The ASUM Bulletin publishes information relating to changes in fees, examination dates, Regulations, etc. Members are kept up to date with this and other related information by automatically receiving the Bulletin.

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GOL □ COAST**

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- Vascular
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**tel +61 2 9958 7655**

**fax +61 2 9958 8002**

**email [asum@asum.com.au](mailto:asum@asum.com.au)**

## 2003 DMU Diplomates

### Cardiac

Miss Sally Bauch  
Miss Hayley Brown  
Mrs Debra Buck  
Ms Julie Collis  
Miss Therese Daley  
Mrs Ritza Driver  
Miss Renae Edser  
Miss Trischa Edwards  
Miss Yuli Goh  
Ms Yvette Hines  
Miss Christine Irving  
Mrs Susan Kitto  
Mr Ian Kwok  
Ms Minh Le  
Mr Tam Le  
Mr Michael Lewis  
Miss Emma Luckhurst  
Miss Jacqueline Malone  
Mr Craig Morgan  
Miss Karen Murchie  
Mrs Janice Murrell  
Miss Danielle Nicholas  
Mr Joseph O'Sullivan  
Miss Elena Pancewicz  
Mr Wayne Pitcher

Miss Rebecca Riddle  
Mrs Dayna Roberts  
Mr Christopher Thomas  
Mrs Amanda Turnbull  
Ms Marina Woods

### General

Mr Brendon Bacon  
Miss Patricia Batiste  
Miss Jessica Brent  
Miss Tracey Cadogan  
Ms Michelle Cahill  
Ms Paula Carryer  
Mr Jonathan Cheetham  
Miss Lisa Cottle  
Mrs Emma Godrik  
Mrs Tania Harrison  
Miss Catherine Hawke  
Mrs Brooke Hazlett  
Ms Alice Hollingsworth  
Mr Donald Hort  
Mr James House  
Miss Rebecca Hunter  
Miss Kelly Kinder  
Mrs Aletta Landman  
Ms Elaine Lau  
Miss Kirsty Lodding  
Mr Craig McQuillan

Mrs Sharon Minch  
Mrs Kerri O'Connor  
Ms Sarah Petterson  
Mr Ying Qin  
Mrs Azin Radfard  
Ms Carla Smith  
Miss Kristin Sternbeck  
Mr Scott Sullivan  
Mrs Fiona Thomson  
Ms Benita To  
Mr Alan Williams  
Mr Jiazeng Zhao

### Obstetric

Miss Rebecca Bates  
Mrs Tirith Treatt

### Vascular

Mr Paul Batt  
Miss Jillian Brown  
Ms Neva Bull  
Mrs Diana Duong  
Mrs Teresa Hayes  
Mrs Brigid Hill  
Mr David Munday  
Ms Santha Muthiah  
Miss Adriana Samayoa  
Mrs Kai-Wee Schrader  
Mr David Su

## 2003 DMU Part I pass candidates

### Cardiac

Mrs Michelle Anderson  
Mr Paul Arumugam  
Ms Nadia Barkla  
Mrs Kathryn Benstead  
Mrs Rebekah Berger  
Miss Kathryn Brown  
Miss Lisa Courtney  
Ms Lauren Crettenden  
Ms Suzanne Davy-Snow  
Ms Chelsea Henderson  
Miss Jane Henzell  
Mrs Janine Kearsley  
Mr David Law  
Miss Kate Loveday  
Mr Scott Manning  
Mr Dekang Mao  
Miss Carrie Morgan  
Mr Anthony Morris  
Mr Drake Owens  
Miss Linda Passfield  
Mr David Peiniger  
Miss Kimberley Prince  
Ms Melissa Sale  
Mr Kym Smith  
Ms Helen Strickland  
Miss Lee Taylor  
Ms Bianca Tucker  
Mr Seamus Walker  
Mr Rohan Wilson  
Miss Melanie Yeates  
Ms Emily Yong  
Ms Julia Zantvoort

### General

Mrs Sadie Atkins  
Miss Rebecca Bary  
Mrs Katie Becker  
Miss Joanne Bolton  
Miss Renee Bolton  
Miss Jennifer Burke  
Miss Helen Charlwood  
Mr Nathan Collins  
Miss Gemma Connick  
Mrs Kogielaranie Dhanapaul  
Miss Kate Easton  
Miss Kathy Eftekhar  
Miss Rochelle Fletcher  
Mrs Lisa Forman  
Ms Ann Garton  
Mrs Kylie Hamilton  
Mrs Susan Hamilton  
Miss Levona Hay  
Mrs Lucy Hellberg  
Mr Adam Hickey  
Miss Debbie Hodder  
Mrs Xinru Hu  
Mrs Joy Hunt  
Mrs Jennifer Hunter  
Ms Emma Hurley  
Mrs Maria Jackett  
Mrs Lisa Jesson  
Mrs Geradine Louis  
Miss Kathryn MacKinlay  
Miss Emma McAlpine  
Mr Christopher Miller  
Miss Rachael Moir

Mrs Shareni Moodley  
Miss Leesa Noy  
Ms Telleisha Odgers  
Ms Ana Maria Ovin  
Ms Jane Paganoni  
Ms Barbara Page  
Miss Nhi Phan  
Ms Catherine Phu  
Miss Carly Porter  
Mrs Emir Roberts  
Miss Rebecca Rutherford  
Mr Selcuk Semirli  
Mr Rajnesh Sharma  
Miss Angela Stamp  
Mr Jianhui Sun  
Mr Christopher Targett  
Mrs Lidia Thomas  
Mr Steven Zakic

### Obstetric

Miss Wendy Gellel  
Miss Patricia Simpson

### Vascular

Ms Julie Bradbury  
Ms Irena Cukovski  
Ms Carol Duncan  
Mr Jason Fong  
Mrs Beverly McKenzie  
Mr Jonathan Meredith  
Miss Tuyet Nong  
Ms Katarina Zegarac

# DMU Board of Examiners Chairman's report

*Ros Savage*

With the expert help of Margo Gill, Lucia Pemble and Bonita Anderson, the ASUM submission for re-accreditation of the DMU was presented to the Australasian Sonographers' Accreditation Registry (ASAR) on Saturday 11 October 2003. The ASAR granted full accreditation in response to a large number of significant changes to the DMU syllabi and the examination processes as well as some significant new regulations governing the conduct of the DMU Examinations.

The more significant changes for the Examination Processes include:

- New syllabi and reading lists were introduced from 2004.
- Two Oral Examinations (or Viva voce) are to be reintroduced as a part of the OSCE from 2005 (Mini Orals have been reintroduced for all of the 2004 OSCEs.).
- Legal and ethical issues topics will be examined for the first time from 2004 in the Written Examinations.
- The candidates will be given the option of submitting practice case studies for feedback before the examinations and will be required to submit five compulsory case studies at the time of their Practical Examinations.
- Case studies proforma will be provided for all candidates to standardise the submission of case studies.
- The introduction of a more formal selection process for DMU Practical Examiners will be adopted from 2004.
- Practical Examiners will be appointed for three year tenure.
- Practical Examiners will undergo training and accreditation in the form of compulsory attendance at one of the DMU Practical Examiners' training/accreditation workshops in each three-year cycle (such training days will be held twice yearly; one at the Multi-disciplinary Workshop and the other at the Annual Scientific Conference).
- Part II candidates may elect to sit the Written Paper only in any year; or they may elect to sit all three examinations (Written, Practical and OSCE) regardless of their results in the

## Part I Examination results by speciality

### Physics

	Candidates	Passes	Pass rate %	Mean
Cardiac	42	36	85.7	60.1
General	76	54	71	57.1
Obstetric	5	2	40	49.5
Vascular	8	6	75	57.8

### Anatomy

	Candidates	Passes	Pass rate %	Mean
Cardiac	32	30	93.8	66.8
General	70	56	80	57.4
Obstetric	5	5	100	59.7
Vascular	10	10	100	61.6

### Written Examination

- Part II candidates (once they have passed their Written Examination component may elect to sit, in any one year, either their OSCE/Oral or Practical Examinations. This gives a greater degree of flexibility for the conduct of the Part II Examination. There is one important proviso: Candidates must successfully complete all Part II examination components within eight years of their original Part I application acceptance.
- Practical Examinations from 2005, where possible, may be run throughout the year to give greater flexibility to Practical Examiners, practices and candidates alike.
- Unsuccessful Part I and Part II candidates may re-sit their failed sections (at a reduced fee) in subsequent examination cycles. This will allow earlier organization of the OSCE and Practical Examinations and avoid any misunderstanding regarding dates and venues.
- From 2005, two Part I Written Examinations will be held (July and October) to allow for re-sits and late applications.
- The 2004 DMU Handbooks were extensively re-written.

In order to satisfy the ASAR registration requirements for Australian candidates wishing to gain student

status, the deadline for DMU applications was brought forward to 31 January in 2004 allowing students to be registered as DMU candidates and, therefore, eligible to register with ASAR as a student. For those candidates who are not affected by the ASAR requirement, a later deadline (1 March) applies.

## Part I Examination

In 2003, 134 candidates sat for the DMU Part I Examination of whom 131 sat the Physics Examination; 98 or 73% passed the Physics Examination and 117 candidates sat the Anatomy, Physiology and Pathology Examination of whom 101 or 86.3% passed.

The table above shows the results by speciality

## Part II Examination

There were 130 DMU Part II candidates of whom 115 were sitting the Written, Practical and Objective Standardised Clinical Examinations (OSCE); one both the Practical Examination and OSCE; eleven sitting the Practical Examination only; and three the OSCE only.

The breakdown into specialties and examination results are laid out in the table that follows (*next page*).

**Part II Examination breakdown by speciality**

	<b>Cardiac</b>	<b>General</b>	<b>Obstetric</b>	<b>Vascular</b>
Written, Prac & OSCE	52	47	2	14
Prac & OSCE	-	1	-	-
Prac	3	5	-	3
OSCE	1	-	2	-
<b>Total</b>	<b>56</b>	<b>53</b>	<b>4</b>	<b>17</b>

**Part II Written Examination results by speciality**

	<b>Candidates</b>	<b>Passes</b>	<b>Pass rate</b>
			<b>%</b>
Cardiac	52	33	64
General	47	36	77
Obstetric	2	1	50
Vascular	13	12	92
<b>All candidates</b>	<b>114</b>	<b>82</b>	<b>72</b>

**Part II Practical Examination results by speciality**

	<b>Candidates</b>	<b>Passes</b>	<b>Pass rate</b>
			<b>%</b>
Cardiac	35	30	86
General	40	34	85
Obstetric	2	1	50
Vascular	15	13	87
<b>All candidates</b>	<b>92</b>	<b>78</b>	<b>85</b>

**Part II OSCE results by speciality**

	<b>Candidates</b>	<b>Passes</b>	<b>Pass rate</b>
			<b>%</b>
Cardiac	34	32	94
General	36	34	94
Obstetric	3	2	67
Vascular	12	9	75
<b>All candidates</b>	<b>85</b>	<b>77</b>	<b>91</b>

The results indicate that a high standard is being maintained in all specialties.

The rigor of the Written Examination has been maintained and this is due to a good deal of hard work by all members of the ASUM DMU Board of Examiners who prepared the questions. All essay questions were double marked and any Fail question was automatically remarked.

Any candidates who failed were provided with individual examiner feedback on their responses to assist them in any future examination attempt. It is very significant that the near 85% pass rate in the Practical Examinations (in those specialties where there is a sufficient number in the sample to draw conclusions) indicates a uniformity of standard across the cohort.

And a special 'thank you' must go to all the examiners who worked so hard to grade papers, provide individual candidate feedback and maintain a uniformly high standard of examination.

Without these dedicated volunteers it would be impossible to run the DMU Examinations.

In closing I wish to thank Dr Christopher Choong, on his resignation, for his contribution to the ASUM DMU Board of Examiners.

**Ros Savage**  
Board of Examiners

**Expressions of Interest in DMU Practical Examiners**

As part of the DMU's successful ASAR re-accreditation, it is now a requirement for DMU Practical Examiners to be trained and accredited.

It is ASUM's intention to provide a wide cross-section of qualified DMU Practical Examiners who, having undergone a standardised training program, will ensure the consistent, high standards of the Practical Examinations into the future. Consequently, limited opportunities exist for selection as a DMU Practical Examiner in 2004.

Expressions of Interest are now being sought from experienced and qualified sonographers for consideration for selection and training as DMU Practical Examiners.

Potential Practical Examiners must be respected in the profession, of superior technical and professional ability and prepared to volunteer three years' commitment to examining.

In addition all interested applicants will need to:

- 1 Be ASAR accredited.
- 2 Attend ASUM DMU Practical Examiner Training/Accreditation days.
- 3 Be Financial ASUM members.
- 4 Be prepared to travel throughout Australia and New Zealand.
- 5 Commit to examine at least five candidates annually for three years.
- 6 Provide a full Curriculum Vitae.
- 7 Provide professional references.

Please apply in writing with attachments (noted above) to:

**Chairperson, DMU Board of Examiners**  
2/181 High Street  
Willoughby NSW 2068

**All Practical Examiners from 2002 and 2003 have already been invited and need not reapply. Practical Examiners from previous years and other members are invited to apply.**

## ASUM Beresford Buttery Overseas Traineeship

It is with great pride that ASUM and GE have the opportunity to offer an annual traineeship in the field of obstetric and gynaecological ultrasound, in memory of Beresford Buttery FRANZCOG, DDU, COGUS who made an inestimable contribution to his profession.

Since its foundation GE Medical Systems has constantly been at the forefront of research and technical innovation, with GE today being recognised as a world leader in the supply of diagnostic imaging systems.

The award will cover attendance at an appropriate educational program at the Thomas Jefferson Research and Education Institute in Philadelphia and will include tuition fees, economy airfare and accommodation for the duration of the course (usually four days).

The award will be made to applicants who:

- 1 Seek to further develop their skills and experience in obstetric and gynaecological ultrasound.
- 2 Have as a minimum qualification Part 1 of the DDU or DMU (or equivalent) or have been awarded the DDU or DMU (or equivalent) within the last five years (since 31 December 1997)
- 3 Have been a financial member of ASUM for a minimum of two years prior to the closing date

Applications should include:

- A *curriculum vitae*
- Details of current and post employment, particularly in the field of obstetrics and gynaecology;
- Testimonials from two referees in support of the application including contact address and telephone number;
- An outline of professional goals and objectives;
- An indication of benefit from award of the Traineeship.

The successful applicant is asked to provide a written report on return from the course.

Applications addressing the criteria should be forwarded by **Friday 25 June 2004** to:

**GE Beresford Buttery Overseas Traineeship**  
c/- ASUM  
2/ 181 High Street  
Willoughby NSW 2068 Australia



**GE Medical Systems**  
Ultrasound

## ASUM Chris Kohlenberg Teaching Fellowships 2004 and 2005 Sponsored by GE Medical Systems Ultrasound

In 2004 the Education Committee plans programs in the Western Australian and New Zealand branches for the Chris Kohlenberg Teaching Fellows. Further details of these programs will be published in the May Ultrasound Bulletin and on the ASUM website: [www.asum.com.au](http://www.asum.com.au)

The Chris Kohlenberg Teaching Fellowship was established by ASUM in association with GE Medical Systems Ultrasound to increase the opportunity for members outside the main centres to have access to quality educational opportunities. It has been awarded annually since 1998 to provide educational opportunities for members in New Zealand, Queensland, New South Wales, Northern Territory, Western Australia, South Australia and Tasmania. It is named to commemorate Dr Chris Kohlenberg, who died while travelling to educate sonographers.

Branches wishing to propose programs for the 2005 Teaching Fellowships should, in the first instance, contact Keith Henderson tel +61 2 9958 6200 fax +61 2 9958 8002  
email [khenderson@asum.com.au](mailto:khenderson@asum.com.au)

Nominations and proposals should be addressed to:

**The Education Manager**  
**ASUM 2/ 181 High St**  
**Willoughby 2068 Australia**

**Submissions should be received before 22 November 2004**



**GE Medical Systems**  
Ultrasound



**11th Annual National Conference  
Australian Sonographers Association  
Melbourne Convention Centre  
Friday 28 – Sunday 30 May 2004**

- € **Innovative education program including scientific presentations, interactive discussion forums and workshops incorporating hands-on scanning.**
- € **Half day vascular ultrasound, Friday 28 May**
- € **Half day obstetric and gynaecology, Friday 28 May**
- € **Cardiac Day, Saturday 29 May**
- € **REGISTRATION BROCHURE NOW AVAILABLE – download from our web site, or contact the ASA National Office.**
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**Further information can be obtained from our website at:**

**[www.A-S-A.com.au](http://www.A-S-A.com.au)**

**or by contacting:**

**ASA National Office**

**PO Box 709 Moorabbin Vic 3189**

**Ph: +61 3 9585 2996 Fax: +61 3 9585 2331**

**Email: [enquiries@A-S-A.com.au](mailto:enquiries@A-S-A.com.au)**

# New members October – December 2003

## Full Members

Michael Barker WA  
 Julie Bedford NSW  
 Marie Behn NSW  
 Anne Blue NZ  
 Julie Broadfoot Qld  
 Jennifer Butters South Africa  
 John Cates NSW  
 Michael Cervenak Qld  
 Sam Chan NSW  
 Michael Coleman Vic  
 Joseph Cowcher WA  
 Sharon Crick Vic  
 Diane Davies WA  
 Melanie Dawson NSW  
 Leila Dekker WA  
 Lisa Dodds NSW  
 Archana Dwivedee NSW  
 Gwen Emms WA  
 Karen Forth SA  
 Linda Gaff Qld  
 Nicole Goebel Qld  
 Meegan Gun SA  
 Kari Haigh Vic  
 Paul Hilton NSW  
 Raymond Hora Vic  
 Robert House Vic  
 Abid Hussain Pakistan  
 Bruce Jack Qld  
 Con Kapsis SA  
 Kim Laing SA  
 Anna Lambrechtsen NSW  
 Peter Landy Qld

Wendy Lilje WA  
 Karen Lines WA  
 Kylie McIntyre NSW  
 Jan Mulholland WA  
 Charles Neubauer SA  
 Karen Newell NSW  
 Kate O'Donoghue NSW  
 Sandra O'Hara WA  
 Belinda Paha NSW  
 Philip Pasfield NSW  
 Naimish Patel WA  
 Michael Reeves NSW  
 Patti Richards NT  
 Rodney Roncari Vic  
 Jyotica Ruba NSW  
 Belinda Scholes Qld  
 Arnold Schraven WA  
 Kathryn Sidebottom WA  
 Ka Man Siu NSW  
 Deborah Steinhardt NSW  
 Fiona Stiff NSW  
 Jacqueline Spurway NSW  
 Rebecca Stokes WA  
 Patrick Sullivan Qld  
 Grace Tai WA  
 Faye Temple Vic  
 Fei Ling Thoo Singapore  
 Anzelle Triegaardt WA  
 Rebecca Tuite Qld  
 Gerrit Van Wageningen South Africa  
 David Walter WA  
 Joanne Wareing-Fowler WA  
 Kym Warner WA

Kym Webb WA  
 Joanne Weir ACT  
 Michelle Wellman SA  
 Lani White WA  
 Russell Whitehorn South Africa  
 Louis Wolfaardt South Africa  
 Jessica Yang NSW  
 Amely Zaininger NSW

## Associate members

Joanne Bolton NZ  
 Kristen Bricknell Qld  
 Melita Decker NSW  
 Samantha Hickman Vic  
 Debbie-Ann Hodder NZ  
 Lara James WA  
 Vikki Milmine NZ  
 Joseph O'Sullivan Qld  
 Sally Pepper NZ  
 Aleem Shah NZ  
 Marcus Silbery NSW  
 Rachel Stevenson NZ  
 Renay Thorp NZ

## Trainee members

Terry Chang NSW  
 Anthony Freeman NSW  
 Lubomyr Lemech NSW  
 Abdullah Omari NSW  
 Choong Leong Wong NSW  
 Kimberley Sleeman Vic

## ATTENTION SONOGRAPHERS

**Applications for ASAR accreditation via Category 4  
 (Competency Based Assessment) close on 31 March 2004.**

**Applications must reach the ASAR Secretariat by 5pm on 31  
 March 2004.**

**Contact the ASAR Secretariat if you require further  
 information.**

**ASAR SECRETARIAT  
 PO BOX 745  
 CASTLE HILL NSW 1765**

# The ultrasound calendar

## **Fri 5 Mar 2004 – 2 days ASUM**

### **Multidisciplinary Workshop**

Conrad Jupiters, Gold Coast,  
Queensland, Australia  
Contact ASUM tel +61 2 9958 7655, fax  
+61 2 9958 8002, email  
asum@asum.com.au

## **Sun 21 March 2004 – 4 days. First International Scientific Meeting of the International Society of Ultrasound in Obstetrics and Gynaecology (ISUOG)**

Contact [www.isuogsingapore.com](http://www.isuogsingapore.com)

## **Mon 22 Mar 2004 Applications close for DDU Part I examination and DDU Part II Written Examination**

Contact DDU Coordinator tel +61 2 9958  
7655, email [ddu@asum.com.au](mailto:ddu@asum.com.au)

## **Fri 7 May 2004 – 4 days VIII World Congress of Echocardiography and Vascular Ultrasound**

Antalya, Turkey  
Contact Navin C Nanda, President ISCU,  
PO Box 323, Gardendale, AL 35071, USA  
tel +1 205 934 8256, fax +1 205 934  
6747, email [iscu@iscu.org](mailto:iscu@iscu.org)

## **Mon 17 May 2004 DDU Part II Written Examination**

Contact DDU Coordinator tel +61 2 9958  
7655, email [ddu@asum.com.au](mailto:ddu@asum.com.au)

## **Mon 17 May 2004 DDU Part I Exam**

Contact DDU Coordinator, tel +61 2 9958  
7655, email [ddu@asum.com.au](mailto:ddu@asum.com.au)

## **Mon 17 May 2004 – 6 days 7th Congress of the Asian Federation of Societies for Ultrasound in Medicine and Biology (AFSUMB), 77th Meeting Japan Society of Ultrasonics in Medicine**

Utsunomyia City, Tochiqi, Japan  
Contact Prof K Itoh, Dept of Clinical Lab  
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Minamikawachi, Tochiqi-ken 329 0498,  
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448 249, email [itokoiti@jichi.ac.jp](mailto:itokoiti@jichi.ac.jp), web-  
site <http://www.congre.co.jp/afsumb2004/>

## **Wed 19 May 2004 – 4 days IXth International MASU Congress and International Course**

Al Assad University Hospital, Damascus,  
Syria  
Contact MASU website  
<http://www.agonet.it/masu>

## **Thur 17 Jun 2004 DDU Part II Oral Examination – cardiology only**

Melbourne  
Contact DDU Coordinator tel +61 2 9958  
7655, email [ddu@asum.com.au](mailto:ddu@asum.com.au)

## **Sat 19 Jun 2004 DDU Part II Oral Examination**

Sydney  
Contact DDU Coordinator tel +61 2 9958  
7655, email [ddu@asum.com.au](mailto:ddu@asum.com.au)

## **Sun 20 Jun 2004 – 2 days Advanced Course in Fetal Medicine**

Paphos Cyprus  
Contact [www.fetalmedicine.com](http://www.fetalmedicine.com)

## **Sun 20 Jun 2004 – 4 days 2004 AIUM Annual Convention**

Desert Ridge Resort, Phoenix AZ USA  
Contact Brenda Kinney AIUM tel +1 301  
498 4100, email [bkinney@aium.org](mailto:bkinney@aium.org) web-  
site [www.aium.org](http://www.aium.org)

## **Tues 22 Jun 2004 – 2 days Third World Congress in Fetal Medicine**

Nicosia Cyprus  
Contact [www.fetalmedicine.com](http://www.fetalmedicine.com)

## **Friday 25 June 4 days The New Zealand ASUM Branch Meeting preced- ed by an OSCE preparation session on Thursday 24 June 2004.**

Christchurch New Zealand  
Contact Rex De Ryke, email  
[rdr1@xtra.co.nz](mailto:rdr1@xtra.co.nz)

## **Sat 31 Jul 2004 DMU Part I and Part II Written Examinations**

Contact James Hamilton DMU  
Coordinator tel +61 2 9958 0317, fax +61  
2 9958 8002, email [dmu@asum.com.au](mailto:dmu@asum.com.au)

## **Tues 31 Aug 2004 – 4 days 14th World Congress on Ultrasound in Obstetrics and Gynecology**

Stockholm Sweden  
Contact S Johnson Ex Dir ISUOG, 3rd Fl,  
Lanesborough Wing, St Georges Hospital  
Medical School, Cranmer Terrace,  
London SW 17 ORE United Kingdom tel  
+44 20 8725 2505, fax +44 20 8725  
0212, email [johnson@sghms.ac.uk](mailto:johnson@sghms.ac.uk)

## **Sat 4 to Wed 8 Sept 2004**

### **ASUM-ANZSVS**

Rotorua New Zealand  
Contact Dr David Ferrar  
email [vascular@clear.net.nz](mailto:vascular@clear.net.nz)

## **Thurs 23 Sep 2004 – 4 days ASUM 2004 34th Annual Scientific Meeting of the Australasian Society for Ultrasound in Medicine**

Sydney  
Contact ASUM tel +61 2 9958 7655, fax  
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[asum@asum.com.au](mailto:asum@asum.com.au)

## **Fri 5 Nov 2004 ASUM Asia Link Program ASUM-MSUM 2004. Joint meeting of ASUM and the Malaysian Society for Ultrasound in Medicine**

Registration information will be available  
from April 2004 on [www.asum.com.au](http://www.asum.com.au)  
Contact to register your interest in attend-  
ing this meeting as a delegate or as a  
sponsor please email  
[caroline.hong@asum.com.au](mailto:caroline.hong@asum.com.au)

## **Wed 8 Dec 2004 – 3 days 36th BMUS Annual Scientific Meeting and Exhibition**

Manchester, United Kingdom  
Contact The British Medical Ultrasound  
Society, tel +44 20 7636 3714, email [sec-  
retariat@bmus.org](mailto:sec-<br/>retariat@bmus.org)

## **2005**

## **Sun 19 June 2005 – 3 days 2005 AIUM Annual Convention**

Walt Disney World Swan and Dolphin  
Orlando, FL USA  
Brenda Kinney AIUM tel +1 301 498  
4100, email [bkinney@aium.org](mailto:bkinney@aium.org), website  
[www.aium.org](http://www.aium.org)

## **Sat 30 Jul 2005. DMU Part I and Part II Written Examinations – provisional**

Contact James Hamilton DMU  
Coordinator tel +61 2 9958 0317 fax +61  
2 9958 8002 email [dmu@asum.com.au](mailto:dmu@asum.com.au)

## **29 Sep – 2 Oct 2005 ASUM 2005 35th Annual Scientific Meeting of the Australasian Society for Ultrasound in Medicine**

Adelaide Convention Centre, Adelaide  
Contact ASUM tel +61 2 9958 7655, fax  
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[asum@asum.com.au](mailto:asum@asum.com.au)

## **2006**

## **18 May 2006 – 3 days X World Congress of Echocardiography and Vascular Ultrasound**

Marrakesh, Morocco  
Contact Navin C Nanda President ISCU

PO Box 323 Gardendale AL 35071 USA  
tel +1 205 934 8256, fax +1 205 934  
6747, email [isuc@iscu.org](mailto:isuc@iscu.org)

**28 May 2006 – 5 days 11th Triennial  
Congress World Federation for  
Ultrasound in Medicine and Biology**

Seoul Korea  
Contact Byung Ihn Choi Congress  
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743 6385, email  
[choibi@radcom.snu.ac.kr](mailto:choibi@radcom.snu.ac.kr), web  
<http://www.wfumb2006.com>

**Sat 29 Jul 2006 DMU Part I and Part II  
Written Examinations – provisional**

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**2007**

**Sat 28 Jul 2007**

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**2008**

**Sat 26 Jul 2008**

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**2009**

**Thurs 5 – Sun 9 Sept 2009 – 5 days  
ASUM hosts WFUMB 2009 World  
Congress**

Sydney Australia  
Sydney Convention and Exhibition Centre  
Contact Dr Caroline Hong ASUM CEO  
email [carolinehong@asum.com.au](mailto:carolinehong@asum.com.au) or  
[asum@asum.com.au](mailto:asum@asum.com.au)  
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If you would like further information on  
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# Guidelines for authors

Authors are invited to submit papers for publication in the categories described below. Final responsibility for accepting material lies with the Editor, and the right is reserved to introduce changes necessary to ensure conformity with the editorial standards of the *Ultrasound Bulletin*.

## Original research

Manuscripts will be subject to expert referee prior to acceptance for publication. Manuscripts will be accepted on the understanding that they are contributed solely to the *Ultrasound Bulletin*.

## Quiz cases

A case study presented as a quiz, involving no more than three or four images and a paragraph briefly summarising the clinical history as it was known at the time. It will pose two or three questions, and a short explanation.

## Case reports

Case reports are more substantial presentations resembling short scientific papers which illustrate new information, or a new or important aspect of established knowledge.

## Review articles

Review articles are original papers, or articles reviewing significant areas in ultrasound and will normally be illustrated with relevant images and line drawings. Unless specifically commissioned by the Editor, articles will be subject to expert referee prior to acceptance for publication.

## Forum articles

Members are invited to contribute short articles expressing their observations, opinions and ideas. Forum articles should not normally exceed 1000 words in length. They will not be refereed but will be subject to editorial approval.

## Calendar items

Organisers of meetings and educational events relevant to medical ultrasound are invited to submit details for publication in the *Ultrasound Bulletin*.

Each listing must contain: activity title, dates, venue, organising body and contact details including name, address, telephone and facsimile numbers (where available) and email address (where available). Notices will not usually be accepted for courses run by commercial organisations.

## Corporate news

Corporate members are invited to publish news about the company, including structural changes, staff movements and product developments. Each corporate member may submit one article of about 200 words annually. Logos, illustrations and tables cannot be published in this section.

## Format

Manuscripts should be submitted in triplicate in print and on PC formatted diskette as MS Word documents.

Images must be supplied separately and not embedded. Powerpoint presentations are not accepted.

- Font size: maximum 12 pt, minimum 10 pt
- Double spacing for all pages
- Each manuscript should have the following:  
Title page, abstract, text, references, tables, legends for illustrations.
- Title page should include the:

Title of manuscript, the full names of the authors listed in order of their contribution to the work, the department or practice from which the work originated, and their position.

Corresponding author's name, contact address, contact telephone number and facsimile number (where available) for correspondence.

- Abbreviations may be used after being first written in full with abbreviation in parentheses.
- References should be cited using the Vancouver style, numbered according to the sequence of citation in the text, and listed in numerical order in the bibliography. Examples of Vancouver style: 1 In-text citation Superscript. If at the end of a sentence the number(s) should be placed after the

full stop or comma.

2 Journal article Britten J, Golding RH, Cooperberg PL. Sludge balls to gall stones. *J Ultrasound Med* 1984; 3: 81–84.

3 Book: Strunk W Jr, White EB. *The elements of style* (3rd ed.). New York: Macmillan, 1979.

4. Book section Kriegshauser JS, Carroll BA. The urinary tract. In: Rumack CM, Wilson SR, Charboneau JW, eds. *Diagnostic Ultrasound*. St Louis, 1991: 209–260.

## Abstract

Manuscripts for feature articles and original research must include an abstract not exceeding 200 words, which describes the scope, major findings and principal conclusions. The abstract should be meaningful without reference to the main text.

## Images

Images may be submitted as hard copy (in triplicate) or in digital format. Images sent must have all personal and hospital or practice identifiers removed. Do not embed images in text. Separate images are required for publication purposes.

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