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Volume 8 Number 1 February 2005

Australasian Society for Ultrasound in Medicine

ULTRASOUND BULLETIN

ASUM Multidisciplinary Workshop

Melbourne 16–20 March 2005. Incorporates:

DMU Preparation Courses 16–20 March

DDU Preparation Course 16–17 March

DMU Practical Examiner Accrediation 17 March

POC Limited U/S Workshop 17 and 20 March

O&G Workshop 18–20 March

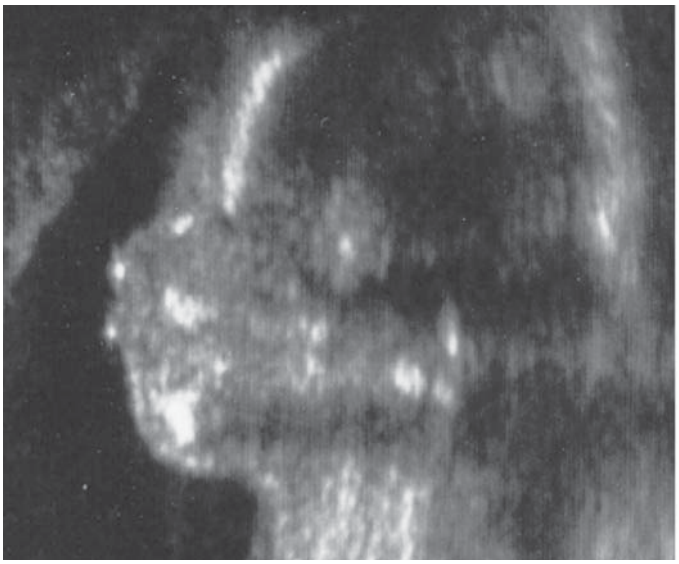
Vascular Workshop 18–19 March

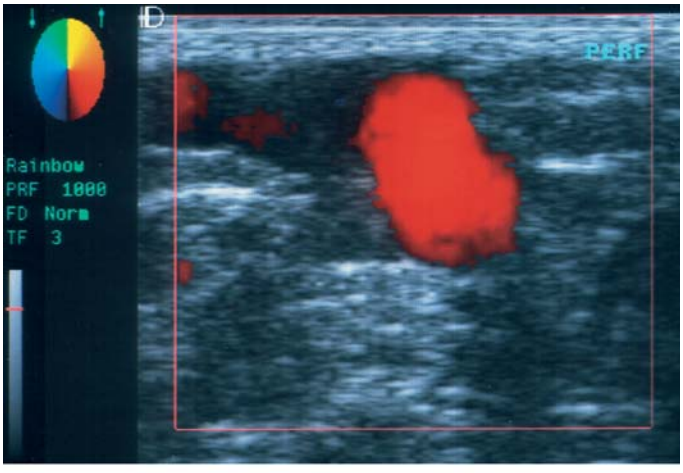
MSK, Breast and Paediatric Sessions 18–19 March

Cardiac Workshop 19 March

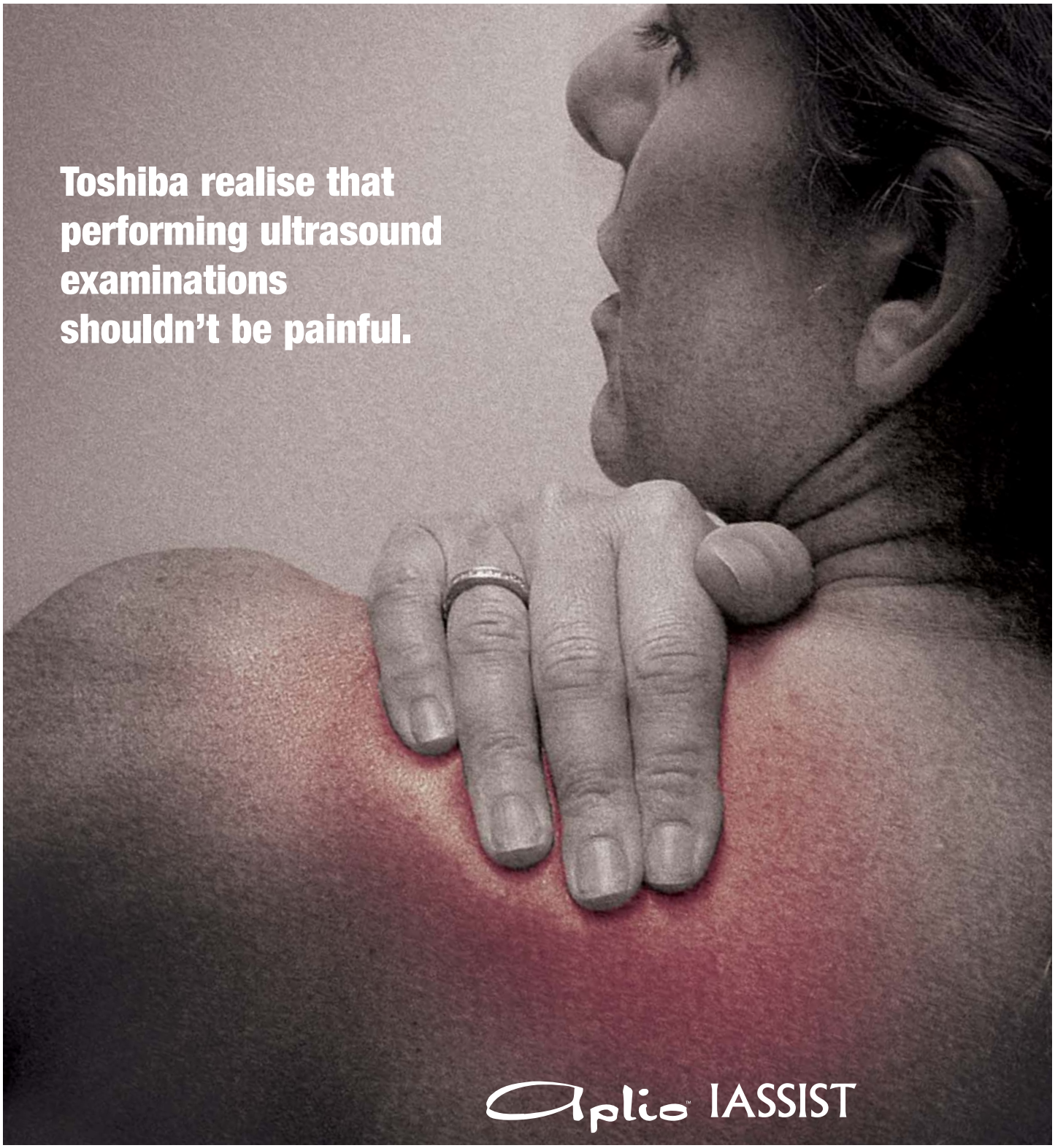
ASUM Annual Scientific Meeting

Adelaide 29 September to 2 October 2005





- Aneuploidy detection in pregnancy
- Cleft lip and palate
- Fetal heart assessment
- Lower leg venous anatomy
- 2004 DMU Examination results
- DMU Examiners' Report



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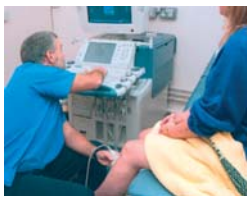

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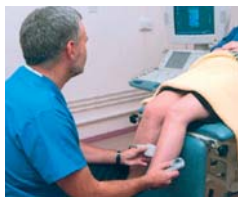

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Australasian Society for Ultrasound in Medicine

ULTRASOUND BULLETIN

ASUM Ultrasound Bulletin 2005 February 8: 1

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for Ultrasound in Medicine

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Editorial contributions
Original research, case reports, quiz cases, short articles, meeting reports and calendar information are invited and should be addressed to The Editor and sent to ASUM at the address below

Membership and general enquiries
should be directed to ASUM at the address below

Published on behalf of ASUM by Minnis Communications
Mr Bill Minnis, Director
4/16 Maple Grove
Toorak Melbourne Victoria 3142 Australia
tel +61 3 9824 5241 fax +61 3 9824 5247
email minnis@minniscomms.com.au

AUSTRALASIAN SOCIETY FOR ULTRASOUND IN MEDICINE
2/181 High Street
Willoughby Sydney NSW 2068 Australia
tel +61 2 9958 7655 fax +61 2 9958 8002
email asum@asum.com.au
website:http //www.asum.com.au
ABN 64 001 679 161

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Notes from the Editor

Another year is firmly underway. ASUM continues to broaden its operational base with educational, scientific and related activities across Australia, New Zealand and now, increasingly, in Asia. The Ultrasound Bulletin contents reflect this activity. This issue also contains a number of articles of excellent scientific value that maintain the educational standard of the journal.

Evidence based medicine principles are used very effectively in Finberg's article on aneuploidy detection in pregnancy. Readers are urged to read this article and apply the use of evidence-based principles in other similar areas of ultrasound practice.

Mitchell and Stone have described a valuable audit to determine the accuracy of a screening program in actual practice. This process is an essential component of quality control for medical practice and may suggest other audit activities in readers' practices.

This issue also includes two superb didactic articles on the venous system of the legs and fetal heart assessment. Both are commended to readers.

A key scientific and educational activity of ASUM is the Annual Scientific Meeting. All ASUM members are urged to set time aside in their continuing educational activity program to attend ASUM 2005. There are two special reasons to come to this year's meeting. First, the venue is Adelaide, truly Australia's most under-rated capital city. Second, the scientific content will be equal to or exceed any ASUM meeting of recent times, with a superb range of invited speakers now secured. This will be a 'must not miss' meeting for the year. See you there.

Roger Davies
Editor

THE EXECUTIVE

EDUCATION

RESEARCH AND TECHNICAL

DMU REPORT

THE SOCIETY

ASUM Multidisciplinary Workshop 16–20th

Wed 16th March 2005

Registration from 8.00 am

DMU Preparation Course: Physical Principles and Instrumentation (See www.asum.com.au/mdw05 for program details)

DDU Technical Seminar: Physical Principles and Instrumentation (See www.asum.com.au/mdw05 for program details)

Thursday 17th March 2005

DMU Preparation Course: Physical Principles and Instrumentation (See www.asum.com.au/mdw05 for program details)

DDU Technical Seminar: Physical Principles and Instrumentation (See www.asum.com.au/mdw05 for program details)

Nuchal Translucency Course (See www.asum.com.au/mdw05 for program details)

Point of Care Limited Ultrasound Course: Emergency Medicine (See www.asum.com.au/mdw05 for program details)

Friday 18th March 2005

Registration from 8.00 am

DMU Preparation Course see www.asum.com.au/mdw05 for program details

Session 1

O&G
Start at 9.00 am

Twin Pregnancy
- Why is twin pregnancy high risk? *Yves Ville*
- Diagnosis of twin-twin transfusion and update on its management *Yves Ville*
- First trimester growth in discordant twins *Yves Ville*
- Fetal surveillance of twins in the 3rd trimester *Andrew Edwards*

Vascular
Start at 9.00 am

The lower Limb Arterial Duplex Examination
- The lower limb arterial duplex examination: what the clinician wants to know *Peter Milne*
- Ultrasound pathology – what criteria should : be used? *Julie Bartholomew*
- Iliac and aortic imaging *Mark Westcott*
- Graft surveillance – stents, angioplasty and interventional procedures of the lower limb arteries *John Vrazas*
- Graft surveillance: ultrasound follow-up of interventional procedures *John Donlan*

General
Start at 8.30 am
- Normal breast ultrasound *Allison Rose*
- Benign and malignant ultrasound features *Prue Neerhut*
- Interventional ultrasound techniques *Arlene Mou*
- Breast Workshop Live scanning
- Breast Workshop Interventional

Session 2

Fetal Heart
- Normal heart *Amanda Sampson and Michael Bethune*
- Abnormal heart *Amanda Sampson and Michael Bethune*
- Scanning the fetal heart – can it make a difference? *Robert Weintraub*

Vascular Live Scanning Workshops
- Lower limb arterial *Julie Bartholomew*
- Graft surveillance: *Yisha Tong*
- Upper arm DVT *Peter Coombs*
- Vessel mapping pre-op. (incl. Allen's Test) *Robert Ziegenbein*
- Carotid stents *Martin Forbes and Jackie Flavell*

General
- Peritoneum, liver and biliary tree *Robert Gibson*

Session 3

Obstetric Workshops
- Normal / Abnormal heart *Michael Bethune, Amanda Samson*

Endoluminal Grafts AAA
Moderator *Andrew Johnston*
- AAA assessment pre stenting *Andrew Johnston*
- AAA the endoluminal procedure *Peter Milne*
- Endoluminal grafts: veins open *Andrew Johnston*
- AAA endograft surveillance post surgery *John Donlan*
- Live scanning: graft in gel and patient with endoleak *John Donlan and Martin Forbes*

Paediatric
- Paediatric eye *Cain Brockley*
- Paediatric Spine *David Davies-Payne*

Session 4

Early Pregnancy
- Update of T21 screening *Yves Ville*
- Fetal abnormality in the first trimester *Simon Meagher*
- Antenatal assessment of CM infection *Yves Ville*
- Choices in prenatal testing *Lachlan de Crespigney*

Vascular Live Scanning Workshops
- AAA assessment *Adam Lawler*
- AAA endograft surveillance *John Donlan and Jackie Flavell*
- Portal hypertension *Paula King*
- Renal duplex *Tanya McDonald*
- Tx Kidney assessment *Fay Temple*

Paediatric
- Neonatal head *Roger Gent*
- Paediatric scanning *Roger Gent*

5–5.30 pm **Drinks**

International Keynote Speaker
Dr Yves Ville
University Hospital of Poissy France
Member of the ISUOG Scientific Committee

March 2005 Melbourne Convention Centre

Saturday 19th March 2005 — Registration from 8.00 am

Session 1

O&G
Start at 9.00 am

Abnormal Uterine Bleeding
- What does a gynaecologist want to know? *Raphael Kuhn*
- How accurately can ultrasound diagnose adenomyosis? *Amanda Sampson*
- Examination of the endometrium *D McGiness*
- Role of saline sonography in AUB *Andrew Ngu*

Vascular
Start at 9.00 am

The Lower Venous Duplex Examination
- What the surgeon wants to know *Gary Frydman*
- Problems of varicose vein scanning *Julie Bartholomew*
- What criteria should be used to assess varicose veins? *Peter Coombs*
- Pelvic and ovarian vein assessment *Ken Myers*
- DVT chronic versus acute *Amy Clough*

General
Start at 8.30 am
- Post-op shoulder *Cheryl Bass*
- Finger pulleys / ligaments *George Koulouris*
- MSK live scanning workshops
- Hand and wrist *Mary Langdale*
- Shoulder ultrasound *Frank Burke*
- Intervention *Cheryl Bass*

Cardiac
Start at 8.30 am
- Echo and systemic diseases *Bonita Anderson*

Quantitative Assessment of Valvular Heart Disease
- Mitral valve disease *Helen Thomson*
- Aortic valve disease *Cathy West*
- Concurrent workshop *Ritza Driver and Jacqui Williamson*

Session 2

Infertility
- Diagnosis of ectopic pregnancy and its management *Simon Meagher*
- Diagnosis of polycystic ovarian disease *TBA*
- Tubal patency study using ultrasound contrast agent *Andrew Ngu*
- When do fibroids become relevant? *Raphael Kuhn*

Vascular Live Scanning Workshops
- Varicose Veins *Martin Forbes and Jackie Flavell*
- Recurrent varicose veins *Robert Ziegenbein*
- Assessing for pelvic veins *Adam Lawler*
- AV fistula assessment *Ming Hao*
- Vessels at the root of the neck *Rebecca Long*

- Hamstring and muscle tears *George Koulouris*
- Osteitis pubis *TBA*

- TTE versus TOE and interesting cases *Cathy West and Paul Caliafiore*

Session 3

Fetal Abnormality
- Current trends in the diagnosis of fetal abnormality *Yves Ville*
- Soft markers of aneuploidy what do they mean? *Monica Pahuja*
- What does a medical geneticist want to know? *Martin Delatycki*
- What does a paediatric surgeon want to know? *Keith Stokes and Joseph Crameri*

- The carotid scan *Martin Forbes*
- Ultrasound planning for carotid stents *Andrew Johnston*
- Ophthalmic signs of carotid disease *Alex Harper*
- *Transcranial* Doppler *Penny Koh*
- Problems of vessels at the root of the neck *John Crozier*

MSK Live Scanning Workshops
- Hip *Chris Lawson*
- Foot / ankle *Judy Wills*

Congenital Heart Lesions
Chair *Jill Fawcett*
- Congenital heart disease *Bonita Anderson*
- Case presentation *Sophie Karapanagiotidis*
- Panel discussion *Jill Fawcett, Sophie Karapanagiotidis, Bonita Anderson*

Session 4

Workshops
- 18 week scan
- Nuchal translucency
- Nasal bone measurement

Advances in Ultrasound Tools or Toys?
- Laser and RF obliteration of VV *Ken Myers*
- Emergency vascular ultrasound *John Crozier*
- Quality assurance: how good are we? *Chris Sykes*
- Reporting the vascular scan *Ken Myers*

Diastolic Function
- Case-based assessment of diastolic function *Bonita Anderson*
- Update: assessment of LV systolic function *Di Jackson*

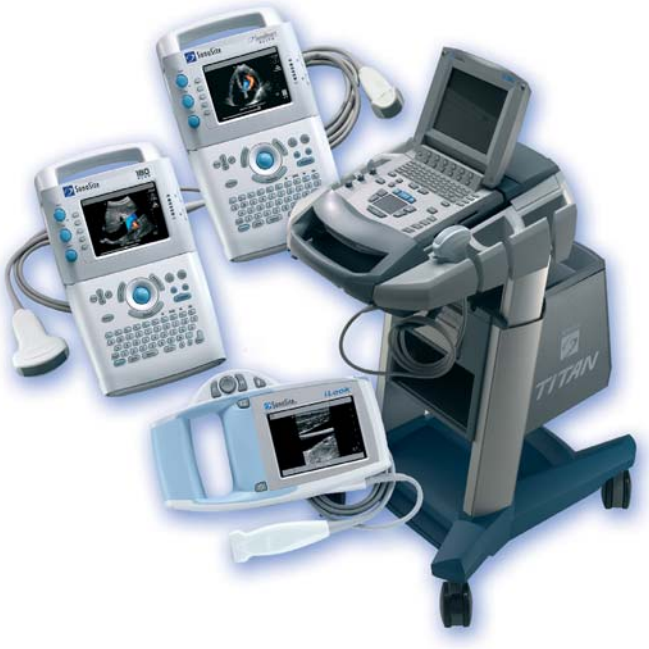
Sunday 20th March 2005 — Registration 8.00 am

DMU Preparation Course (See www.asum.com.au/mdw05 for program details)

Point of Care Limited Ultrasound Course: Obstetrics (See www.asum.com.au/mdw05 for program details)

Pelvic Floor Ultrasound 2D–3D–4D (See www.asum.com.au/mdw05 for program details)

CARRYING HIGH PERFORMANCE ULTRASOUND INTO THE FUTURE



THE BEGINNING

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SonoSite has established a direct operation to support the expanding needs of highly-portable, high-performance, ultrasound users in Australia and New Zealand. SonoSite Australasia will develop local training and educational resources to assist and supplement the activities of InSight Oceania – SonoSite's Australasian distribution partner.

Greg Brand is a 25 year senior management veteran of the ultrasound industry and is the managing director of SonoSite Australasia.

Shelley Thomson is SonoSite's clinical marketing manager for Australasia. She has over 14 years experience in the ultrasound industry and, similarly to Greg, is widely-known through past positions with ATL and with Philips.

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President's message

Dr David Rogers

Welcome to the first issue of the ASUM *Ultrasound Bulletin* for 2005. The year has started off with a rush, now that everyone has returned from their summer holidays and is making up for lost time. I hope that Santa filled your Christmas stockings well and that you all had a relaxing summer break.

Multidisciplinary Workshop

The first item on the ASUM calendar this year is the Multidisciplinary Workshop to be held at the Melbourne Convention Centre in the middle of March. This event has become a fixture on the ASUM calendar, now in its third year. It has become a focus for ASUM activity and many educational and business activities have been scheduled around the event.

Special thanks to Andrew Ngu and his team who have worked very hard to put together what I am sure will be a great program.

At the workshop weekend the first ASUM Council meeting of the year will be held. In addition to the usual business, we are also organising a strategic plannning session to devote time to the future direction of ASUM.

Frequently, we become engrossed in the processes of life and fulfilling our obligations. It is often difficult to find enough time to reflect on how and what we should be doing. This session is, hopefully, the beginning of a process to gain precise direction for ASUM over the next five years. There are many issues to consider; some having recently developed, and some that are steeped in history. Large issues that face us are planning for WFUMB 2009, local branch communication and activity, financial policy, the research fund and the future of the DMU. I shall be reporting back on the outcome of the initiative in subsequent Bulletin messages.

International profile

ASUM has been working hard to raise its international profile, especially in view of the successful bid to hold WFUMB 2009. ASUM now has a high profile throughout Asia and, recently, we have successfully formed a liason with the Danish Society for Diagnostic Ultrasound (DSDU).

You may wonder how this came about. Dr Christian Nolsoe of DSDU conceived the liaison upon learning that the Crown Prince of Denmark has married an Australian woman, Princess Mary. You may recall Christian paid us a visit at the recent Sydney meeting. A Memorandum of Understanding is in the final stages of signing and the liaison will see an exchange of speakers for Annual Scientific Meetings and, hopefully, a 'Young Ultrasound Researcher Exchange Program'. Roger Davies and myself are the representatives on the joint committee and we will be presenting at the DSDU International Interventional Ultrasound Meeting in Copenhagen next year. It looks like a very good meeting and we would encourage you to attend, if possible.

Additionally, ASUM has recently set up a Presidential Exchange Program with BMUS, the British Medical Ultrasound Society.

Last year, Jane Bates spoke at the Sydney meeting and Glenn McNally attended the December 2004 BMUS meeting. This year I am an invited speaker at the BMUS meeting, an honour no doubt, and Manchester in

Dr Jack Jellins, right, receives his Life Member plaque from ASUM President Dr David Rogers

December will be a contrast with summer in the South Pacific.

Next year, Dr Grant Baxter will be the BMUS President and will be an invited speaker at the ASUM Annual Scientific Meeting in Melbourne 14–17th September 2006.

We anticipate signing a Memorandum of Understanding with BMUS and may look to widen our interaction.

These activities certainly have a positive spin off for ASUM and help provide a ready group of speakers for the Annual Scientific Meetings, thus making the organisation process a lot easier.

MOSIPP program

Over the last six months, in New Zealand, ASUM has been negotiating to have the MOSIPP program accepted as an approved CPD program.

The NZ Medical Radiation Technologists Board now requires all radiographers to be enrolled in a CPD program. This was introduced rather precipitously and without much consultation with the ultrasound sector.

After much negotiation and some excellent work from Keith Henderson, MOSIPP is now approved. This is certainly good news for NZ sonographers as they were being compelled to have to join the NZ Institute of Medical Radiation Technology, the radigraphers' institute, which would have been rather pointless.

The requirement for CPD will be enforced in the 2005–06 year and NZ sonographers are advised to enrol at www.asum.com.au/mosipp.htm

DMU Examination

Over the last six months, I have been part of the ASUM DMU Board of Examiners and I must say how impressed I am at the commitment and expertise demonstrated by the members of the ASUM DMU Board of Examiners.

Delivering medical credentialling in the 21st century is a complex task requiring great consistency and transparency. I would like to reassure all DMU candidates that the processes are well sorted and very precise.

Naturally, not all can come away with a positive result and the inclusion of a practical examination provides scope for perceived subjectivity; this component of the DMU examination, however, is probably the most important and I fail to see how we could credential sonographers without it.

DMU results are all well considered as the ASUM DMU Board of Examiners discusses all candidates (anonomously) at length, before recommending to the ASUM Council to release their results. The work involved is large but worthwhile.

Congratulations to all successful candidates and thank you to the ASUM DMU Board of Examiners.

Best wishes for 2005

I hope 2005 is a good year for you all. I look forward to reporting back to you from the Stratgic Planning Day and hope to see you at the Multidisciplinary Workshop.

David Rogers
President ASUM

website : www.asum.com.au

Australasian Society for Ultrasound in Medicine

Website: www.asum.com.au

ASUM extends a warm welcome to you

ASUM 2005 meetings:

18 - 19 Mar	Multidisciplinary Workshop	Melbourne Australia
29 - 31 July	ASUM 2005 New Zealand (Joint Meeting with RANZCR)	Wellington New Zealand
29 Sept - 2 Oct	Annual Scientific Meeting	Adelaide Australia
10 - 11 Nov	ASUM Asia Link Program	Bangkok Thailand

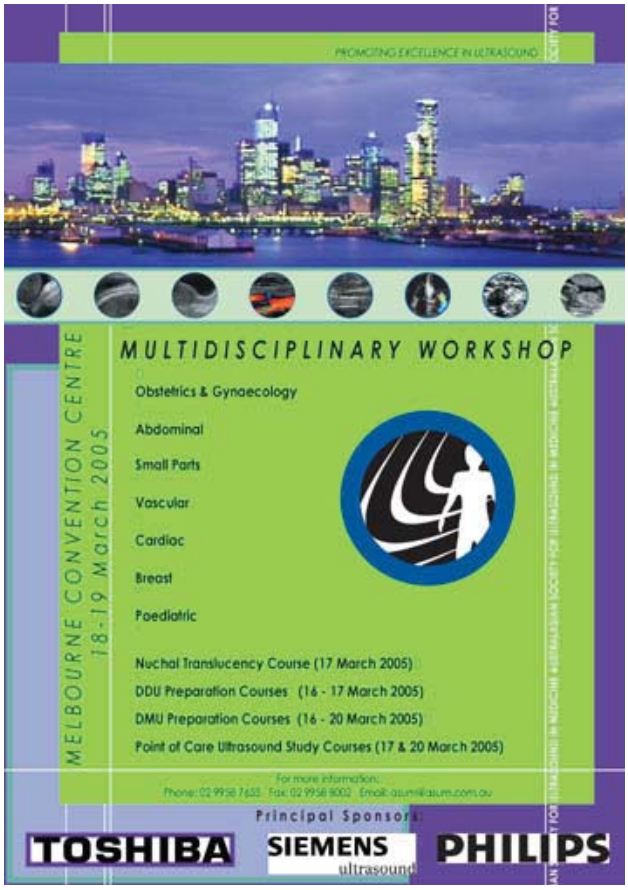
ASUM 2006 meeting: 21 - 24 Sept Melbourne Australia

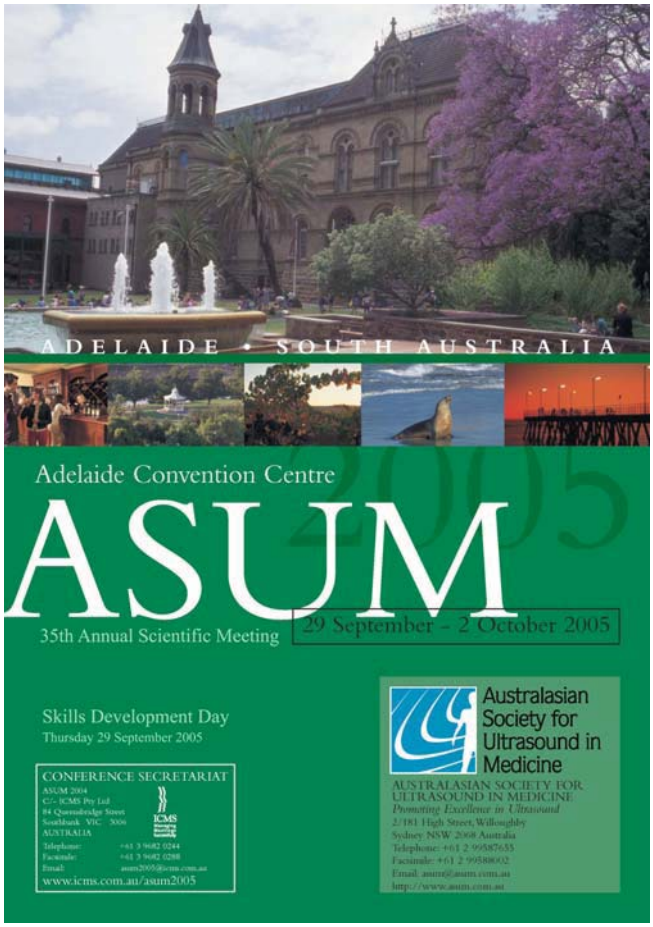
WFUMB 2009 World Congress: Sydney
5-9 Sept WFUMB2009 Congress to be hosted by ASUM

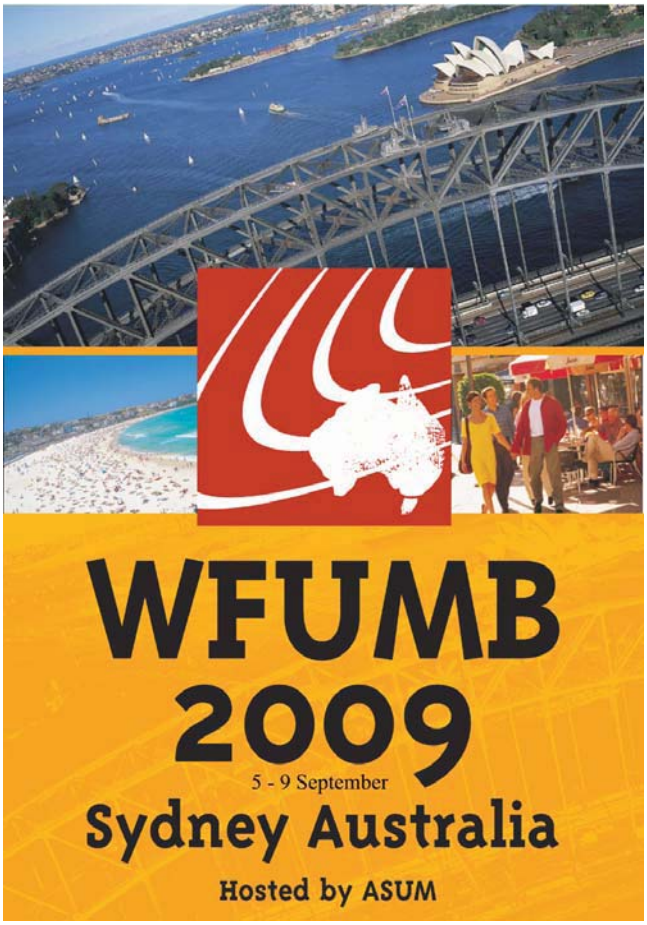
For details, please contact ASUM

Address: Suite 2, 181 High Street
Willoughby NSW 2068
Sydney, Australia
Phone: +61 2 9958 7655
Fax: +61 2 9958 8002
Email: asum@asum.com.au

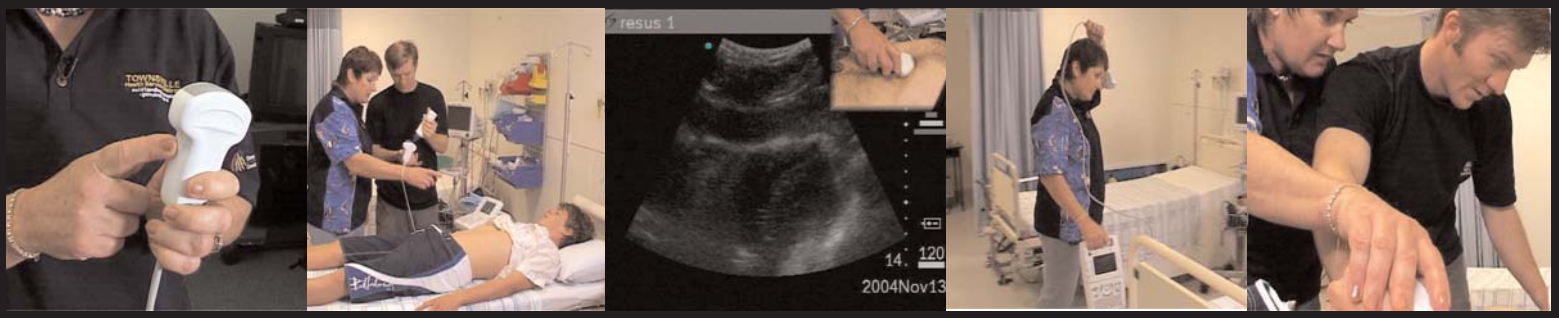
ASUM CEO: Dr Caroline Hong : carolinehong@asum.com.au







PROMOTING EXCELLENCE IN ULTRASOUND



ACRRM's Introduction to Emergency Medicine Ultrasound Video & DVD

The Australian College of Rural and Remote Medicine (ACRRM) has put out an educational video*/DVD on Emergency Medicine Ultrasound.

It is suitable for a wide range of health professionals including rural and remote doctors, sonographers, radiologists, medics and emergency medicine doctors.

It covers Emergency Medicine Ultrasound including:

- An introduction to the use of Ultrasound in Emergency Medicine – Ultrasound in the Field
- Scanning the normal abdomen
- The Focused Assessment with Sonography for Trauma (FAST) scan
- Abdominal Aortic Aneurysm (AAA)
- Scanning for Gall Stones

ACRRM
Member Cost - $35
Non-Member Cost - $40
PLUS Postage & Handling:
Domestic - $5.00
Overseas - $25.00

The video/DVD features Associate Professor Suzie Langlois (Chief Radiologist, Townsville Hospital), Dr Gary Shepherd (Registrar) and volunteer models with Peritoneal Dialysis, Abdominal Aortic Aneurysm and Gall Stones.

Other ACRRM Ultrasound education resources include:

- Basic Obstetric Ultrasound Manual
- Obstetric Ultrasound CD-Rom "The Art of Obstetric Ultrasound"
- Video of ACRRM's First National Obstetric Ultrasound Satellite Broadcast
- Video of ACRRM's Second National Obstetric Ultrasound Satellite Broadcast - The Sequel
- DVD of video clips from ACRRM's First National Obstetric Ultrasound Satellite Broadcast
- ACRRM Ultrasound Online

For a list of all ACRRM Obstetric Ultrasound educational resources, please visit the ACRRM website: http://www.acrrm.org.au under "Shop".

*PAL Video runs for 1 hour

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CEO's message

Dr Caroline Hong

Greetings and best wishes for another busy year in 2005. I hope that all of you have had a chance to relax and rejuvenate over the festive season in December and January.

The Tsunami tragedy, which affected many families in Asia, really brought home how fragile life is. It was indeed very humbling to see so many people dip deep into their pockets to offer aid through the many charities in Australia and New Zealand.

With all the media publicity, it was not surprising that even young children became thoughtful of the families affected. I was moved to see my 10-year-old son give all his Christmas pocket money to the local Tsunami Appeal collection bin, without any prompting, and my adult daughter give one day's wage to the collection. This may not be very much, in the big picture, but the feeling of empathy was felt throughout the country by a lot of people. We wish the countries that are affected in Asia, a speedy recovery.

The year ahead

As outlined in the President's message, the ASUM Head Office is facing another busy and exciting year ahead with strategic planning for a focussed future direction.

The linkage programs with Asia, Denmark (DSDU) and Britain (BMUS) are all making progress.

Work relating to all four major ASUM meetings for the year will take up most of our time and focus. In addition to this, the ASUM secretariat deals with the the important work of the DDU Board of Examiners, DMU Board of Examiners and ASUM Council and Committees to ensure that ASUM remains relevant to its members and its objectives.

WFUMB 2006 World Congress in Seoul, Korea

ASUM members are reminded that attending the 11th World Federation for Ultrasound in Medicine and Biology World Congress to be held in Seoul Korea from 26th May to 1st June 2006 is an opportunity not to be missed.

Information is constantly being updated on the WFUMB websitehttp://www.wfumb2006.com or you can send an email to wfumb2006@radiol.snu.ac.kr for more information. At this World Congress, ASUM will be represented by invited speakers and also by an ASUM booth. The booth will be promoting WFUMB 2009 which will come to Sydney from 5–9th September 2009.

As the WFUMB World Congress is a triennial congress it will be a long time before such an event comes to this part of the world again. The last time the WFUMB World Congress was held in Australia was in 1985.

All ASUM members intending to attend WFUMB 2006 are encouraged to register their interest early and to plan ahead for this exciting event.

ASUM Multidisciplinary Workshop – March 2005 in Melbourne

A lot of work has gone into preparing and organising the ASUM Multidisiciplinary Workshop 2005 to be held in Melbourne on 18–19th March 2005 at the Melbourne Convention Centre.

This time, it will be an even busier meeting with other ASUM business going on from 16th March to 20th March 2005 over five days.

The ASUM DMU and ASUM DDU preparation courses will be con-

ducted at the same venue.

Other ASUM Council business meetings, including the Strategic Planning Day, will also be conducted during the same period in Melbourne.

Our gratitude goes to the Convenor, Dr Andrew Ngu, a Past President and Honorary Fellow, who continues to give his expertise and time willingly to contribute to many ASUM activities.

I am also grateful that all my ASUM staff, Keith Henderson, Education Manager, in particular, together with Judy Vickress, James Hamilton, Marie Cawood, Matthew Byron, Nancy Leung and Iris Hui at the ASUM head office have all worked together very hard as an effective team to prepare this event.

Once again, we are grateful to our sponsors, Toshiba, GE, Siemens and Philips who are platinum sponsors this year, to all the volunteer speakers and all supporters of this event.

ASUM NZ Branch and RANZCR NZ Branch joint meeting 28–31st July 2006

A Memorandum of Understanding is being explored, to be signed by the CEOs of ASUM and RANZCR for our joint meeting, which will be held at the Wellington Convention Centre in Wellington, New Zealand.

The theme will be *Abdominal Imaging*, with sessions relating to obstetrical and gynaecological ultrasound.

The local organising committee consists of volunteers from ASUM NZ and RANZCR NZ. MIA Medical Industry Association, a conference management company, has been appointed to manage the meeting.

Details are being updated constantly on the ASUM website at http://www.asum.com.au. A call for abstracts has also been posted on the website, with details. This meeting offers ASUM members an opportunity to visit New Zealand to enjoy the beautiful scenery and friendly people.

The ASUM Council will meet on Saturday 30th July in Wellington.

ASUM 2005 Annual Scientific Meeting 28th September to 2nd October 2005

The ASUM 2005 ASM is making progress with the program content and the speakers nearly all finalised.

ICMS Pty Ltd has again been engaged to assist ASUM with the conference management.

Members are advised to lock in the dates 28th September to 2nd October 2005 for another fantastic ASM in Adelaide.

Stephen Bird, Roger Davies and the local organising committee have worked hard to ensure a stimulating program. International and local speakers are already being confirmed; this promises to be a fantastic program which will embrace all facets in promoting excellence in ultrasound.

The venue of the event is the Adelaide Convention Centre. The Adelaide Hyatt Regency Hotel has been chosen as the conference hotel. It has a 5-Star rating and offers excellent service and facilities, and is situated adjacent to the Convention Centre. Other excellent hotel accommodation will be offered as options to suit all those intending to attend.

Adelaide is a beautiful destination, with many attractions. It was voted by the Economist Intelligence Unit as one of the top 10 places in the world to live in 2002, declared by *New Yorker Magazine* as: "possibly the last well planned and contented metropolis on earth" and acclaimed by Lonely Planet as "civilised and calm in a way that no other Australian state capital can match".

Adelaide is also known to be the wine and festival capital of Australia, and one of the most vibrant, stylish and innovative cities you'll ever visit.

With rolling hills, pristine beaches, a lively nightlife, galleries, cafes, pubs, bookshops, fashion houses, antique stores, cellar doors and national parks all within its boundaries, Adelaide is certainly a city you will want to come back to time and time again. Fine food, great wine, a sense of history and the good life can all be found in this elegant city, home to more than a million people.

Adelaide is a feast in every way. In fact it's said there are more restaurants per head of population than anywhere else in Australia.

Adelaide is also where much of the Aussie cuisine delighting the world is being created.

A great deal of information is available on the website at http://www.acta.com.au which may be useful to help you in planning your visit to attend the ASUM 2005 Annual Scientific Meeting.

The ASM in Adelaide is an ideal opportunity to combine business with leisure; so bring your family and friends.

ASUM Asia Link Meeting in Thailand 10–11th November 2005

Planning has started and more details will be available after April 2005.

The first joint meeting with the Medical Ultrasonic Society for Thailand (MUST) was held on 4–5th November 2003 in Bangkok. It was a successful meeting with cooperation from ASUM working together with the executive members of MUST.

About 150 delegates attended the program at the last meeting, which was supported by many local trade exhibitors. A similar program will be presented this year.

A meeting with the current President of MUST has been scheduled during the ASUM MDW in March to progress the project and to sign a Memorandum of Understanding between ASUM and MUST.

Interest and enquiries are already coming in for this meeting. Past delegates at ASUM Asia Link Program meetings have reported favourably on the opportunities to meet and exchange information with professional colleagues from different cultures, as well as on the opportunities to experience the amazing attractions in the host country, at a reasonable cost.

These meetings certainly go a long way towards establishing positive long term working relationships and creating understanding and support for each other in achieving mutual and common objectives.

ASUM 2006 Annual Scientific Meeting 14–17th September 2006 in Melbourne

The dates for the ASUM 2006 Annual Scientific Meeting are now confirmed as 14–17th September 2006 at the Melbourne Convention Centre.

ICMS Pty Ltd has again been engaged to assist ASUM as the conference managers.

The Convenor for ASUM 2006 is Dr Andrew Edwards, supported by Drs Andrew Ngu and Matthew Andrews as the Scientific Co-convenors. ASUM is currently looking for a sonographer

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volunteer for the Co-convenor role.

ASUM 2007 Annual Scientific Meeting September 2007 in Cairns

Council has approved a booking for the ASUM 2007 Annual Scientific Meeting to be held in Cairns, a destination which will appeal to many Australian, New Zealand and international delegates as a meeting venue. Cairns has an international airport with direct flights to many countries, and is a favourite destination for overseas visitors.

The World Heritage listed Great Barrier Reef is certainly a popular attraction. The Cairns Convention Centre has fantastic facilities and is recognised as amongst the top venues in the Asia Pacific region.

ASUM Awards, Scholarships and Teaching Fellowship

Most members will be familiar with the long list of annual scholarships offered through and by ASUM, such as the Beresford Buttery Traineeship, Giuilia Franco Scholarships, Best Sonographer Research Awards, Best Research Presentation Awards, Best Clinical Presentation Awards and so on.

The ASUM Council has also agreed to allocate, from the ASUM Asia Link Program Fund, scholarships of up to $A5000 each to several ultrasound societies in Asia. This will offer opportunities to their members to attend short ultrasound training courses in Australia or New Zealand, which in turn will benefit the community and the ultrasound profession in its commitment to setting the highest standards of practice in diagnostic ultrasound.

The ASUM Research and Grants Fund, which was started in 2002, now has $A250,000. The surplus from future ASUM meetings will be added to this fund. ASUM aims to build up to $A1 million in the fund to make the program sustainable and viable in the long term.

Members are welcome to apply for funds for research projects within the guidelines and criteria of the policy set by the Research and Grants Committee.

Members or supporters can also make voluntary donations to ASUM specifically for this fund, which will be gratefully acknowledged.

Please feel free to contact me or any of the ASUM staff at the ASUM Head Office if you have any questions or need any assistance. For regular updates visit the ASUM website at http://www.asum.com.au .

Congratulations to Dr James Barry Roche

We were delighted to hear that Dr Roche was awarded the Medal of the Order of Australia (OAM) on 26th January, Australia Day this year. Dr Roche was recognised for service to medicine in the field of obstetrics and gynaecology and to the Crown Street Womens' Hospital. Congratulations have been sent to Dr Roche, on behalf of ASUM, for this prestigious award.

Dr Caroline Hong
Chief Executive Officer
email carolinehong@asum.com.au

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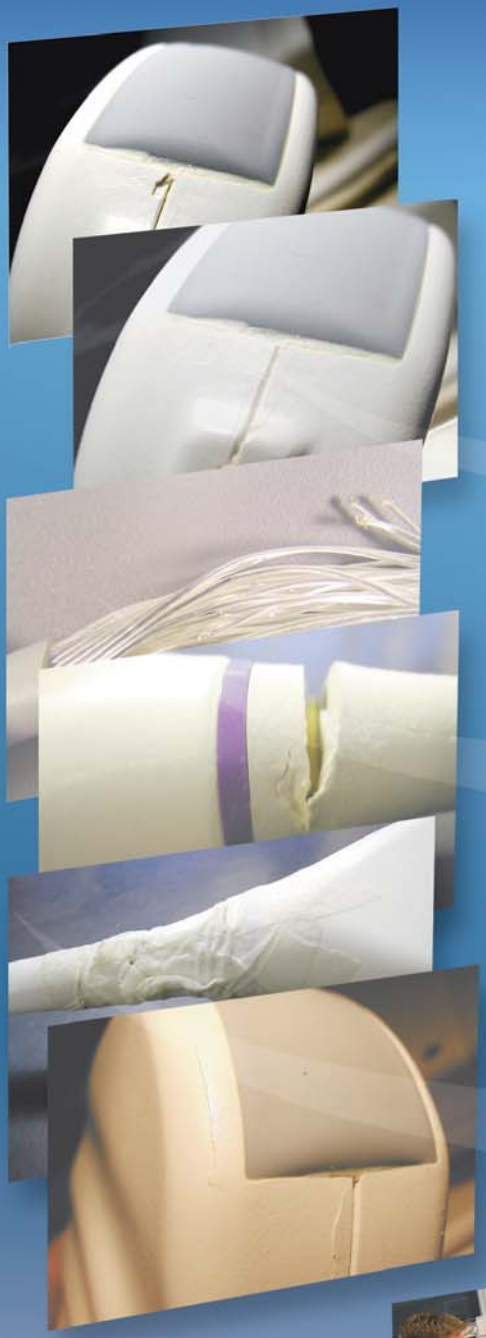

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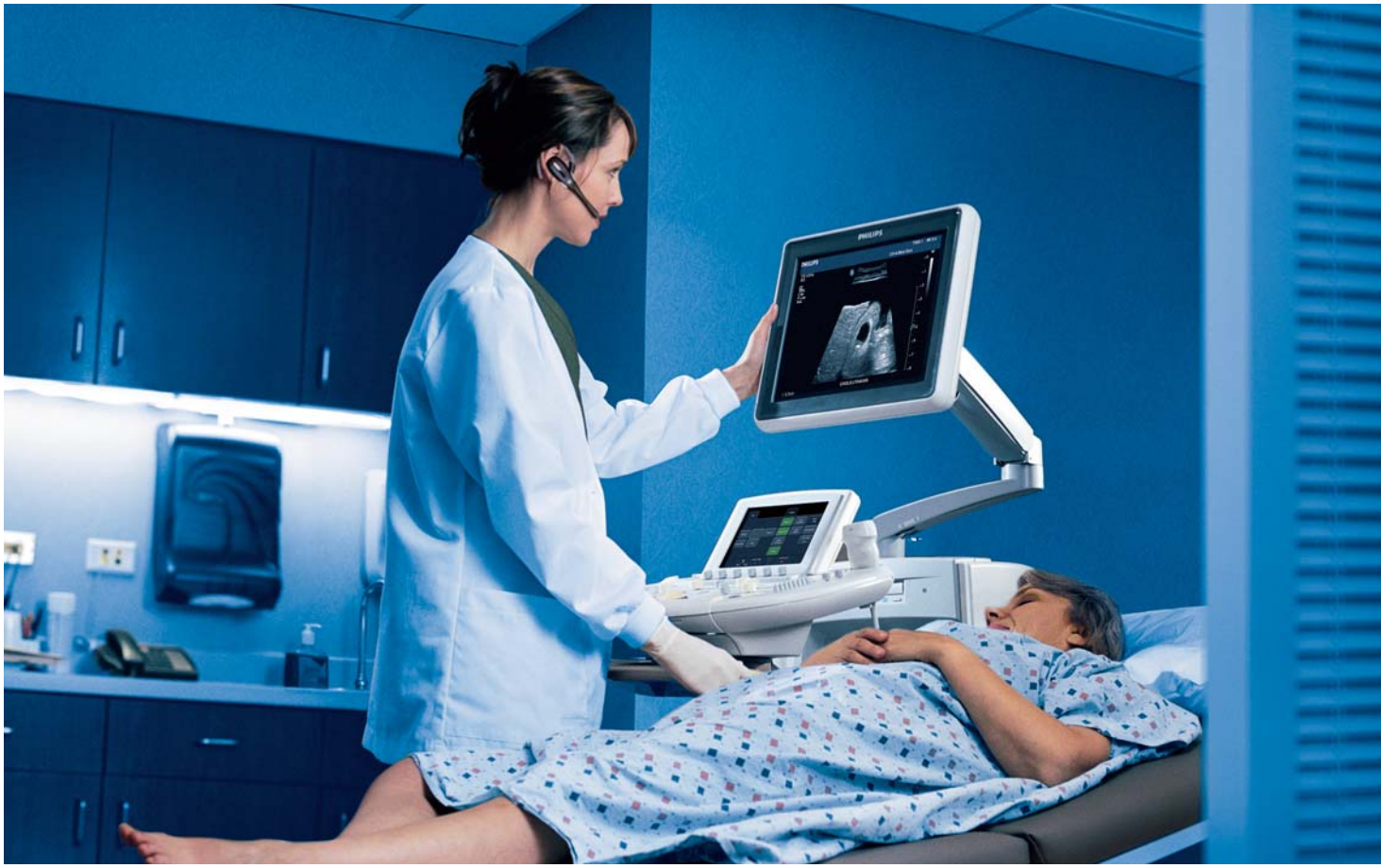

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Aneuploidy detection in pregnancy: an evidence based approach

Harris J Finberg

Objectives

1 Describe the second trimester fetal sonographic abnormalities and marker findings in aneuploidy, primarily trisomy 21, and order them by their relative significance.
2 Discuss the first trimester fetal sonographic evaluation for aneuploidy.
3 Explain how a patient-specific risk for aneuploidy may be approximated by combining age, serum analytes, and fetal sonographic findings.

Introduction

The evaluation of aneuploidy risk has evolved over the last three decades, and recently crossed a threshold that will lead to substantial changes in the strategies used to assess those risks:

1 Screening will be offered universally to all pregnant women, not just high-risk groups; and
2 the screening tests will be initiated at 11–13 weeks gestation.

The primary indicator for amniocentesis in the 1970s was advanced maternal age, 35 years and older. In the 1980s, amniocentesis also was offered based on screening by serum analytes and/or 'marker findings' on an obstetrical sonogram recognised to occur more frequently in a fetus with trisomy 21 or 18 than in the population of normal fetuses.

An important conceptual shift occurred in the 1990s. Evidence showed that a favorable serum screen and/or a normal detailed obstetrical sonogram could realistically decrease aneuploidy risk. A pregnant woman of advanced maternal age might therefore reasonably use this reassuring information to choose not to undergo amniocentesis with its inherent risk of miscarriage.

Now this concept has been further extended. Each pregnant woman, regardless of age, can be assigned an individualised risk of Down syndrome (DS) and of trisomy 18 in her current pregnancy based on a combination of serum screening and sonography. This risk assessment has been performed at 15–20 weeks, but there is a rapidly developing trend toward shifting of evaluation to the 11–13 week stage – with an increase in the detection rate of these two aneuploidies, now approaching 90%.

Correspondence to
Harris J Finberg MD
Director, Diagnostic Ultrasound
Phoenix Perinatal Associates
1331 N 7th Street, Suite 275
Phoenix, Arizona 85006 USA
email Harris_Finberg@obstetrix.com

This review will discuss the methods currently in use for aneuploidy risk assessment, concentrating primarily on ultrasound screening for DS, but with comments about sonographic findings in trisomy 18. The importance of using serum screening in conjunction with sonography will also be emphasised.

Second trimester ultrasound for Down syndrome

The second trimester genetic sonogram evaluates the details of the fetal anatomic survey. Almost all anatomic malformations are more likely to occur in a fetus with DS or other aneuploidies. The survey also seeks so called 'marker' findings – sonographic observations about the fetal appearance or measurements that are not abnormalities, but that occur more frequently in a fetus with DS than in a population of euploid fetuses. There is a very long list of these subtle phenotypic differences, and they have widely varying sensitivities for predicting the likelihood of DS. The best markers are found often in DS and rarely in normal fetuses, while poor markers have only a relatively slight difference in incidence between these two populations.

The first practical approach to sonographic screening for Down syndrome was a qualitative 'scoring index' described by Benacerraf and coworkers[1]. Findings were assigned two points as a major risk marker or one point as a minor risk marker. Two points or more indicated sufficient risk – 1:250, about the average risk at age 35 – to counsel the patient about having amniocentesis to determine if DS is present:

Finding	Points
Anatomic structural anomaly	2
Dorsal nuchal thickness >/= 6 mm	2
Echogenic bowel (bright as bone)	1
Short femur	1
Short humerus	1
Echogenic intracardiac focus (EIF)	1
Renal pyelectasis >/= 4 mm AP	1
Choroid plexus cyst (CPC)	1

Benacerraf's group, and essentially all others that have evaluated the success of ultrasound in screening for Down syndrome in second trimester, cautioned that the research was done in a high risk population, advanced maternal age (AMA) or increased serum screen risk, and that these screening methods might have unacceptably high false positive rates among lower risk women. This is the consequence of a statistical principle called Bayes' theorem.

Bayes' theorem and implications for Down syndrome screening

The efficacy of a medical test is often described by its

sensitivity, the percentage of individuals affected by a particular condition that is identified by the test, and its false positive rate, the percentage of the people that will test positive for the condition despite being normal. However, an additional piece of information is needed in order to determine how well the test is going to perform: It is necessary to know the prevalence of the condition in the population being tested.

Consider a theoretical test for detecting Down syndrome, but with realistic efficacy statistics of 80% sensitivity (also referred to as true positive rate) and a 5% false positive rate. Assume also that patients who are screen positive will choose to have amniocentesis to confirm or exclude the diagnosis. The risk of miscarriage from this invasive test is in the range of 0.4% or 1:250. Apply this test to two different populations of 10,000 pregnant women each:

1 high risk of DS – 1:100 (equivalent to average age of 39 years); and
2 low risk – 1:1000 (average risk for early 20s).

The following analysis is approximate, and not exactly statistically rigorous.

Population 1: 10,000 patients with DS risk 1:100

- 100 cases of Down syndrome of which 80 will be detected
- 500 normal patients will be identified – false positive
- 580 amniocenteses done
- 7.25 amniocenteses done for each DS case detected
- 2.3 miscarriages from amniocenteses done to find 80 DS cases

Population 2: 10.000 patients with DS risk 1:1000

- 10 cases of Down syndrome of which 8 will be detected
- 500 normal patients will be identified – false positive
- 508 amniocenteses done
- 63.5 amniocenteses done for each DS case detected
- 2.0 miscarriages from amniocenteses done to find 8 DS cases

Benacerraf's group recognised the consequences of

Age 35 – 39	1 point
Age 40 and up	2 points

Bayes' theorem, and modified their scoring index to reflect patient age.

Thus, if even one single minor DS marker is detected in a patient 35–39 years old, the risk is high enough to consider amniocentesis. In women age 40 and older, the *a priori* risk of DS is so high that it exceeds the risk threshold (1:250) even when the detailed sonogram is completely normal.

With this modified scoring index in a high-risk population, ie. a score for marker findings of 1 or greater, or age 40 even with no markers, 75% of DS cases were detected while doing amniocentesis on only 26.3% of this group[2]. This compares to simply doing amniocentesis on 100% of these high-risk patients, detecting 100% of their DS pregnancies, but increasing the number of post procedure miscarriages.

Quantitative risk assessment – increasing and decreasing risk

Nyberg et al. made an important conceptual advance in DS risk assessment, developing a method for quantifying the change in the patient's *a priori* risk based on her age or her serum screen result, multiplied by a numerical relative risk figure for each (ie. one or more) sonographic finding. He called this the 'Age-adjusted ultrasound risk assessment' or AAURA[3]. The list of markers he found useful is remarkably similar to Benacerraf's qualitative scoring index, and their relative importance is similar, with major and more minor risk findings.

Sonographic finding	Likelihood ratio
Structural anomaly	25.0
Nuchal thickening, 6 mm	18.6
Echogenic bowel	5.5
Shortened humerus	2.5
Shortened Femur	2.2
Echogenic intracardiac focus	2.0
Renal pyelectasis	1.6
Normal	**0.4**

The most important contribution of Nyberg's research is the demonstration that a normal detailed sonogram reduces the likelihood of DS by about 60%. Prior to this paper, ultrasound findings were used only to indicate increased risk, but now could realistically reduce risk for some high-risk women, who might then feel sufficiently reassured to decline amniocentesis. A similar conceptual change for serum screening now also allows that testing to reduce as well as raise risk for both trisomy 21 and 18.

Nyberg reported on the performance of AAURA in a retrospective study of 142 fetuses proven to have DS and 930 age matched normal controls. Using a positive threshold of 1:200, the results of this study also show the effect of Bayes' theorem.

- In low risk women under age 35 years, it was possible to detect just over half of DS cases while doing amniocentesis in only 4% of normals.
- In the moderate risk group, age 35–39 years, two-thirds of DS cases were detected while doing amniocentesis in only 12.5% of patients, instead of the 100% detection by 100% amniocentesis rate without AAURA.
- In women age 40 years and up, the *a priori* risk of DS was so high that even with the 60% reduction from a normal sonogram, it still exceeded the 1:200 threshold, and all would receive counseling to consider amniocentesis.

Other studies of second trimester ultrasound detection rates for Down syndrome

Many other studies of second trimester sonographic detection of DS have been published. The great majority has been in high-risk populations, and authors uniformly caution against extrapolating results to lower risk groups (ie. the Bayes' theorem issues). Two representative papers are worthy of mention.

Vintzileos[4] used a very extensive list of risk markers, using essentially all that have been reported, including hypoplastic 5th middle phalanx and sandal gap toe, among others. Using a subset of these that were most selective for DS among his retrospective study group, he could detect 87% at a 6.7% false positive rate. If he used all of the markers, the sensitivity remained 87% and the false positive rate doubled to 13.4%. Thus, a more extensive list of risk markers to screen for is not necessarily better. Unfortunately, the

markers that perform best in one study population may well differ from the most efficient ones in a different experimental group – and some that appeared to have high screening efficiency in one report performed very poorly in others.

Devore[5] used a somewhat different group of findings including CNS malformations, choroid plexus cysts, and disproportion of right and left cardiac ventricles along with nuchal skin thickening, hyperechoic bowel and pyelectasis. He achieved 75% sensitivity of DS detection at 6.4% false positive rate. He, like Nyberg, calculated an improved relative risk for DS after a completely normal sonogram: 0.27 (fairly similar to Nyberg's 0.4 RR).

Hobbins[6] was the principal investigator in an eight-centre study of the genetic sonogram in high-risk patients. Using eight markers, similar to the Benacerraf and Nyberg criteria (except for using nuchal thickness of 5 mm rather than 6 mm) as well as an anatomic structural fetal survey, DS detection averaged 71.6% (range: 63.3% to 80%). Nuchal fold of 5 mm alone detected 46.5%, and a condensed regimen of nuchal fold, femur length and structural survey detected 56.8%. Unfortunately false positive rates were not reported.

Receiver operating characteristic curves

Bahado-Singh and his co-workers[7], in reporting their results of sonographic screening for DS in a high-risk population, incorporated two important methodological modifications.

1 They recorded the risks from dorsal nuchal skin thickness and humeral length as a calculated numerical deviation relative to the median for age matched normal fetal controls. Thus, they recognised that it is not logical to consider a nuchal thickness of 5.9 mm as reassuring and yet have a 6.0 mm measurement be a highly worrisome marker for DS. These parameters do not confer risk as a step function, by crossing a threshold, but rather as continuous variables.

2 They reported the efficiency of their study protocol for detecting DS as follows:

- Using risk > 1 in 50 as screen positive: 60% sensitive at 4.5% false positive
- Using risk > 1 in 200 as screen positive: 90% sensitive at 16% false positive

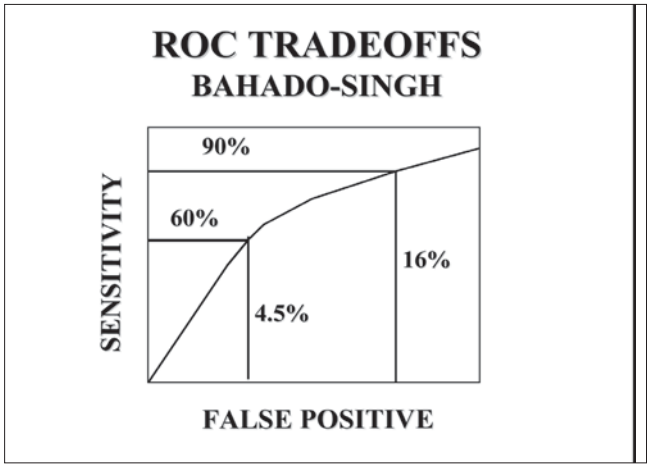

Figure 1 ROC curve for the detection of Down syndrome based on a clinical study by Bahado-Singh. The sensitivity for detection can be increased by lessening the strictness of the diagnostic screening criteria, but this will be accompanied by an obligate increase in the false positive rate

Experimentally gathered data do not, in general, produce a unique disease detection/false positive result. These represent, instead, interrelated variables defining a continuous curve called the Receiver Operating Characteristic (ROC) curve. In the case of Down syndrome, the nuchal thickness, for example, will detect a progressively greater number of affected fetuses as the threshold of an abnormal value is moved from 6 mm to 5 mm and even lower. As that threshold is lowered, the test will necessarily identify a progressively greater number of normals as false positives. Plotting this relationship creates an ROC curve.

The use of an ROC curve can help in selecting different public health strategies for different segments of the population. Women with a high risk for DS, either because of advanced maternal age or high serum screen risk, would in general be expected to undergo amniocentesis if they desired to know antenatally. Therefore a test with high sensitivity, even though it has a high false positive rate, will still reduce the number of invasive procedures and yet detect the majority of affected fetuses.

Women at low risk by younger age or favorable serum screening are, alternatively, not contemplating having amniocentesis. A more appropriate strategy for them is to keep the false positive rate low, 5% or less, recognising that relatively few DS fetuses will be found, but that none would have been detected in this low risk group if sonographic testing had not been used.

This is the framework in which a management strategy discussion is held at the population or public health level, but clearly, the decision as to whether to undergo amniocentesis or not is made one case at a time, by each individual pregnant woman.

The genetic counselling she receives must convey her personal level of risk for Down syndrome (as well as any other identified risks such as for trisomy 18 or spina bifida), and then she can weigh that again the risk of miscarriage from amniocentesis, bringing to bear her own personal situation, values and ethical beliefs.

Nasal bone evaluation for Down syndrome

Sonek and Nicolaides in 2002[8] described absence of ossification of the nasal bone in fetal profile views as a new observation for DS in three second-trimester fetuses. The association of this observation with DS was confirmed by Vintzileos[9] in a retrospective 4:1 case controlled study of high-risk patients. Twelve of 29 second-trimester fetuses with DS and 0/102 normal controls had absent nasal bone. Use of the nasal bone absence increased detection of DS from 83% (24 of 29) to 90% (26 of 29).

Several authors have subsequently observed that a visible but shorter than anticipated, hypoplastic nasal bone may also increase risk for DS. Bromley[10] suggested using a ratio of biparietal diameter (BPD) to nasal bone length (NB). Odibo[11] in a prospective study of a high-risk population applied ROC analysis, and his group found that a BPD/NB ratio of 11 or greater had a sensitivity of 50% and likelihood ratio of 7.1 for presence of DS.

The finding has a similar predictive specificity for detection of trisomy 18. As with other marker findings, this observation alone should not be used to diagnose aneuploidy, but it should be used in conjunction with other

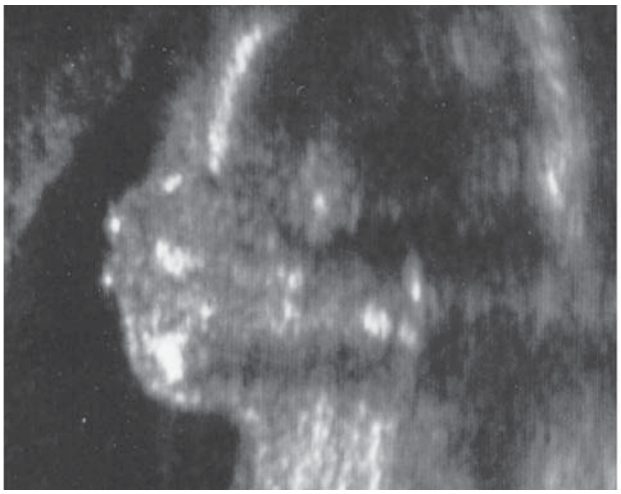

Figure 2a Hypoplastic nasal bone is seen in a mid-sagittal profile view of a fetus of a 19 y.o. woman with increased serum screen risk for Down syndrome. The only other sonographic marker finding was a left ventricular echogenic intracardiac focus. Amniocentesis confirmed Down syndrome

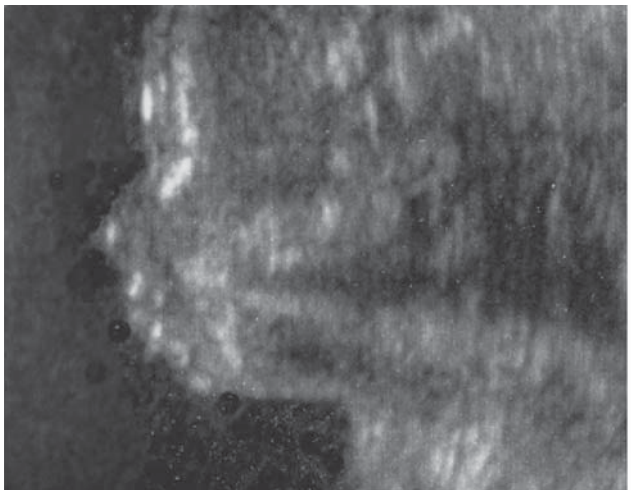

Figure 2b Normal nasal bone.

aneuploidy markers to adjust the patient's risk of DS and other chromosomal abnormalities.

Utility of second trimester ultrasound for Down syndrome detection: summarisation from many studies

Although rates do vary from study to study, generally DS detection rates fell within the range of 60% to 80% with false positive rates of 10% to 15%. Very high false positive rates, particularly for individual minor markers such as the EIF, can be anticipated, and so no single marker should be used to define a sonogram as a positive screen for DS. Rather a multiple marker screening protocol should be used.

Furthermore, there is a consensus from these studies that a genetic sonogram alone is an inefficient screen for DS, ie. neither adequately sensitive nor with an acceptably high specificity (low false positive rate.) There is wide agreement that the sonogram should be interpreted in relation to the maternal serum screen. The second trimester serum screen analyzes alpha-fetoprotein, human chorionic gonadotropin, estriol, and, in some protocols, inhibin A, and it incorporates maternal age to calculate patient-specific risks for three conditions: Down syndrome, trisomy 18, and open neural tube defect.

The serum screen has been traditionally reported to patients as 'positive' when it crosses a threshold – 1/270 for DS or 1/150 for T18. In the currently evolving method of risk analysis, the actual risk numbers must be used instead, so that they can be modified by the relative risk(s) of sonographic findings or of a normal sonogram. It is essential that obstetricians and their staff abstain from using phrases like, "Your blood test screened positive for Down syndrome." They must learn to explain that the degree of risk for DS, T18, and nural tube defect (NTD) can only be interpreted from the combination of the serum screen and the sonogram.

Various mathematical methods for modifying risk by the sonogram have been developed, as in some of the studies discussed above. On average, a normal sonogram appears to reduce DS risk by 60% to 75%. In my practice, I generally tell patients that the normal sonogram reduces DS risk by at least half. Although this is probably a slight underestimate of the risk reduction, I find that patients seem to make decisions about amniocentesis based on qualitative changes in risk relative to their *a priori* risk: substantially reduced, unchanged to slightly increased, or significantly increased.

Value of sonography for aneuploidies other than Down syndrome

Sonographic abnormalities or marker findings can be anticipated in 65% to 80% of fetuses with Down syndrome, but will be found in a much greater percentage of fetuses with other aneuploidy conditions.

In trisomy 18, fetuses at 15 to 18 weeks have been found to have detectable abnormalities in 80% to 90%, and beyond 18 weeks findings, usually multiple, are present in nearly all. Bronsteen, in two companion studies in 2004[12,13], found that none of the fetuses with T18 among his cases had choroid plexus cysts (CPC) as the only sonographic abnormality, although three of them had abnormally clenched hands

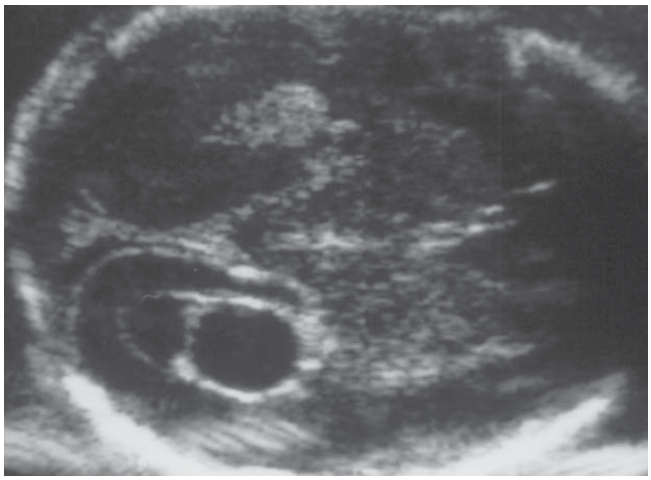

Figure 3 A unilateral large choroid plexus cyst is present. Recent studies by Bronstein indicate that CPCs in fetuses with trisomy 18 tended to be large, and they had the appearance primarily of a cyst with thick surrounding echogenic rim rather than a small circular anechoic defect within a choroid plexus of echogenic tissue

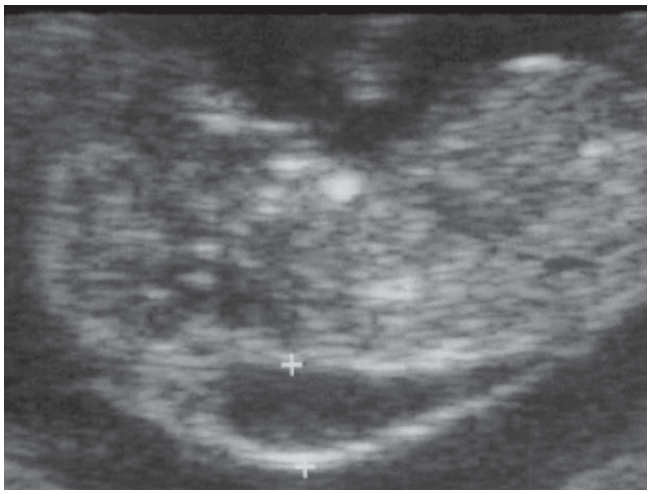

Figure 4 This fetus has a markedly abnormal dorsal nuchal translucency, exceeding 5 mm. Even though the image does not meet the criteria used for accurate measurement of NT thickness for assessment of DS and T18 risk, a NT this thick indicates risks even in a euploid fetus of anatomic malformations, especially cardiac and thoracic, among others, as well as the risk of progression toward generalised hydrops

as the only other detected finding. When CPCs were found in fetuses with T18, they were large, none smaller than 9 mm, and they altered the appearance of the choroid plexus to that of a cystic structure surrounded by a hyperechoic rim.

Small CPCs or heterogeneity of the choroid plexus was not a finding of T18 within his patient population. This strongly suggests that isolated small CPCs are unlikely to increase the risk of T18 substantially. They can probably be reasonably ignored unless there is a significantly elevated maternal serum screen risk for this condition.

Nearly every fetus with trisomy 13, Turner syndrome, and triploidy will have detectably abnormalities regardless of gestational stage. Therefore, when a patient is trying to decide about amniocentesis in the presence of a normal detailed genetic sonogram, the risk of T18 or these other aneuploidies is markedly reduced. Her risk analysis is appropriately focused on the half to two-thirds reduction of Down syndrome risk relative to whatever her serum screen risk for that condition is.

Choroid plexus cysts and Down syndrome

In Nyberg's AAURA study, the relative risk of DS with presence of CPCs was calculated to be 1.0, or apparently an unrelated observation. However, he also found that a completely normal sonogram with no marker findings had a relative risk for DS of 0.4. That indicates that there is a weak association of CPCs to DS as well as their more clearly recognised relationship to trisomy 18. When a CPC is detected, the chance that the fetus has DS is over twice as great compared to one with none. Using Nyberg's methodology, the patient's *a priori* risk for DS is multiplied by 1.0, and it remains unchanged rather than being reduced by 60%.

Several other sonographic observations are probably best analysed in a similar fashion. Echogenic intracardiac foci have substantially different racial prevalences. These occur in 5% of Caucasian and Black fetuses, but they are far more common in Asian fetuses, found in up to 30%. It is, therefore, certainly not appropriate to raise DS risk for an EIF in the Asian population. Relative risk values have not been reported for this group, but the current suggestion is to treat this finding as RR 1.0. Asian fetuses also tend to have statistically shorter femur lengths, and using RR 1.0 for this risk marker in them is also reasonable.

A single artery umbilical cord (SUA) has a very strong association with a wide range of aneuploidies when it is found in association with additional fetal anomalies. As an isolated observation, though, the risk of aneuploidy is much weaker, but not absent. It is recommended that RR 1.0 be used for the isolated SUA, as well.

Dorsal nuchal translucency and first-trimester risk assessment

Dorsal nuchal translucency (NT) has become an important measurement parameter for evaluating the risk of Down syndrome at the significantly earlier gestational stage of 11 0/7 weeks to 13 6/7 weeks. The NT has proven to be a very powerful screening tool for a surprisingly wide variety of other fetal problems, too. It may be increased not only in DS, but in all types of aneuploidy, as well. It may also be enlarged in a large number of non-chromosomal syndromes, in a variety of anatomic abnormalities including major cardiac malformations and diaphragmatic hernia among others, and may also be early evidence for risk of progression toward full-blown hydrops and/or dorsal nuchal cystic hygroma.

Thus, even if a fetus with a significantly enlarged NT is found to be chromosomally normal, a detailed anatomic survey scan in second trimester including an echocardiogram is warranted.

As will be discussed below, risk of aneuploidy increases as a continuous function of the NT, but the approximate upper limits are in the range of 2.2 mm in the 11th week, 2.5 mm in the 12th week, and 2.8 mm in the 13th week.

Extensive clinical research on NT has been done within many countries over the last decade. Much of the pioneering work was done by Nicolaides and colleagues at the Fetal Medicine Foundation in London. In 1994 he[14] reported 86% sensitivity for detecting all trisomies at a false positive rate of 4.5%. His colleague, Snidjers[15] published data for detecting Down syndrome among 96,127 women with age risk at or greater than 1/300, reporting 82% sensitivity at 8.3% false positive, or 77% sensitivity if the NT threshold was adjusted to give a false positive rate of 5.0%.

The early reports on NT have not all been as promising. Some found very poor sensitivities for DS detection, as low as 9% to 29% at unacceptably high false positive rates of 23% to 24%.

Issues in the use of dorsal nuchal translucency

Several important concepts have emerged that must be addressed if NT is to have widespread utility.

- Normal thickness varies with fetal age, and at each crown-rump length, the NT vs. aneuploidy risk is treated as a continuous function rather than as a threshold for abnormality.
- To ensure consistency of measurements by each examiner and uniformity of measurements among many examiners, there must be meticulous technique that requires training and ongoing quality control.
- As with second-trimester assessment of DS risk, the

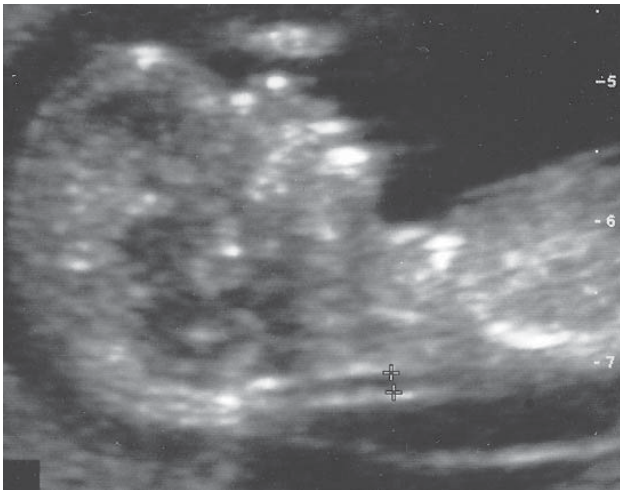

Figure 5 A well positioned and properly magnified image for measurement of the dorsal nuchal translucency. Note the correct placement of the calipers and amnion clearly demonstrated deep to dorsal nuchal skin of the fetus.

sonographic measurement of NT by itself is less sensitive and has a higher false positive rate than when the NT is combined with chemical analysis of serum analytes (that also incorporates maternal age).

- With these issues addressed, combined NT and serum analysis is a powerful method for evaluating the risk of Down syndrome and trisomy 18 at 11 0/7 to 13 6/7 weeks, and can reasonably be offered to all pregnant women, not just those who are high risk.

The training for performing the NT measurement precisely and reproducibly is beyond the scope of this review, but the requirements for adequate imaging include the following:

- The image must be a precise midline sagittal plane.
- The fetus must be in neutral position, with neck neither flexed nor extended.
- Magnification must be sufficient so that calipers can be moved by 0.1 mm increments.
- Imaging settings with a short dynamic range increase sharpness of the nuchal translucency boundaries.
- The fetus must move so that the outer boundary of the NT can be distinguished from the underlying amnion.
- Caliper positioning is precise, 'on to on' with the horizontal line of the + placed on the echogenic margin of tissue on each side of the nuchal translucency rather than within the lucency itself or deeper within the tissue margins.
- Significance of the NT measurement is not reported alone, but only after mathematical analysis that includes appropriate serum analytes.

Dorsal nuchal translucency and maternal serum screening strategies

Two differing protocols for first trimester DS and T18 risk assessment are currently in clinical use. In the Combined Test, the NT is analysed with a single blood test in first-trimester that measures free beta human chorionic gonadotropin (hCG) and pregnancy associated plasma protein-A (PAPP-A). In the Integrated Test, the NT is evaluated with two blood tests, one in first-trimester for PAPP-A and then a second-trimester quad screen, with results only reported out after the NT and both blood tests have been completed.

At fixed false positive rates, the integrated test has slightly higher sensitivities than the combined test, but reporting is delayed by as much as a month since the second blood test cannot be done until the 15th week. An additional caveat is that if the results of the first stage of testing are reported to patients, some may elect invasive diagnosis (chorionic villous sampling) at that time. Those remaining who go on to the second trimester screen become a lower risk group, and risk assessments must be recalculated to account for this.

Two important prospective studies have evaluated these risk assessment strategies.

The BUN study[16] evaluated 8514 patients of any age at 10 4/7 to 13 6/7 weeks by age, free beta-hCG, PAPP-A, and NT. Positive screen for DS was set at 1:270, and for T18 at 1:150. Sensitivity for DS was 85.2% at 9.4% false positive, or 78.7% if the false positive rate was set at 5%, very similar to Nicolaides' earlier study. In the segment of the study population at or greater than 35 years of age, the screen achieved 89.8% sensitivity at 15.2% false positive rate. Triple serum screen DS detection in second-trimester has an equivalent sensitivity of 89% but at over twice as high a false positive rate of 34%. As in other trials, the BUN study was more efficient at detecting T18, 90.9% at 2.0% false positive rate.

The FASTER trial[17,18] (First And Second Trimester Evaluation of Risk for Aneuploidy) was an 11-cente prospective study of 33,557 pregnant women of any age seen at 10 3/7 – 13 6/7 weeks for NT and PAPP-A, who then underwent a second-trimester detailed sonogram and serum quad screen. For DS the first-trimester screen detected 76% at 3.2% false positive, and the serum quad screen detected 84% at 8.4% false positive. When either or both tests were positive (ie. Integrated Test), the ROC analysis gave this range of DS detection results: 94% at 10.8% false positive, 90% at 5.4% false positive, or 85% at 2.8% false positive. This initial paper of the FASTER results did not evaluate the role or modification of risk numbers from incorporating the second trimester detailed sonogram into the calculations. Further reports on the trial results are anticipated.

Recommendations for Down syndrome and trisomy 18 risk assessment

It is my strong belief that DS and T18 risk assessment will shift to the first trimester, as a primary screening strategy worldwide over the next several years. Both the Combined (first-trimester only) and the Integrated (first and second-trimester) Tests have validity. The Combined Test has earlier reporting of information to the patient, permitting earlier definitive diagnosis by CVS. Detection sensitivity is slightly lower than the Integrated Test, and it does not include alpha feto-protein screening for open neural tube defect, which must be separately offered after 15 weeks. (In this approach, there is a strong recommendation that quad screen not be done with the 15 week AFP, because of the greater likelihood of false positives among these patients remaining after removal of those who were screen positive in first-trimester and have already had a CVS).

The Integrated Test has the highest sensitivity for DS and incorporates AFP screening for open NTD. Its major

limitation is that results are held until the second blood test is done after 15 weeks, as much as four weeks after the patient initiates testing. Alternatively, first-trimester results can be reported with some patients electing CVS, and the rest going on to second-trimester testing, but with statistics for screen-positive adjusted for the decreased prevalence of DS and T18 in this selected group

Anecdotally, different groups of women have expressed strong preferences for each of these approaches, and there is, as yet, no consensus as to the best or most acceptable strategy.

The role of the detailed second-trimester sonogram is less clear. It may still have some, but probably a secondary, role in aneuploidy assessment. Nonetheless, it is very likely to persist for the important task of identifying anatomic fetal malformations.

Regardless of whether the Combined or Integrated Test will predominate or both will be used, it is a near certainty that the first-trimester will rapidly become the initiation time for aneuploidy risk assessment. The detection rates will be sufficiently high and the false positive rates sufficiently low that screening will be offered uniformly to all pregnant women rather than to a high-risk advanced maternal age subset only. The parameters measured, NT and serum analytes will be treated as continuous variables, allowing a mathematical calculation of risk. This will make counseling of patients more straightforward and less anxiety provoking, and it will give them a more rational framework within which to make decisions about definitive testing by CVS or amniocentesis.

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Audit of detection of fetal cleft lip and palate by ultrasound in central Auckland 1995–2000

JM Mitchell and P Stone

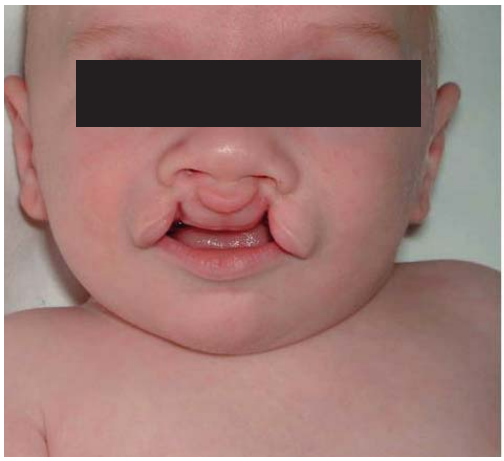


Figure 1a Midline cleft and palate

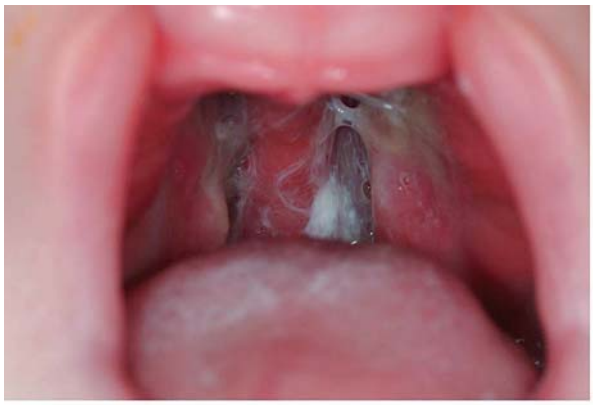


Figure 1a

Figure 1b Cleft palate

Introduction

Detection of cleft lip and palate before birth helps to prepare the parents and relatives for a visually disturbing deformity of the lip (Figures 1 and 1a).

Objective

To audit the ultrasound screening for detection of cleft lip and cleft lip and palate in central Auckland, New Zealand.

Background

Cleft lip and palate results from failure of fusion of the frontal prominence with the maxillary process during embryogenesis[1], and is the most common congenital facial deformity at birth.

Cleft lip/cleft palate is an entity separate from isolated cleft palate, median cleft associated with holoprosencephaly, and median cleft syndrome[2]. The prevalence of cleft lip and palate is 1:7003[3,5]. The risk of recurrence in a subsequent child is 4%, with two affected siblings 9% and up to 17% if a one sibling and one parent are affected[4].

When parents have been informed that their baby has a cleft lip and maybe a palate abnormality they may meet with the Cleft Team prior to birth for information about the treatment plan after delivery.

In Auckland, the core Cleft Team is based at Middlemore Hospital and is comprised of the paediatrician, plastic surgeon, speech-language therapist, orthodontist and the ENT surgeon. This team puts the family in touch with the support group. Referral is made to other professionals. Feeding issues are addressed and the appropriate measures are put in place prior to the birth. (special feeding bottles, hire of breast pump etc.). Babies with cleft lip only will have minimal feeding problems and should not have speech problems. Most parents value the information prior to birth[7] so that the birth is not clouded by the discovery of a cleft lip.

Correspondence to
JM Mitchell
Department of Obstetrics and Gynaecology
University of Auckland
Auckland New Zealand

Methods

The database was developed including:

- All babies born at National Women's Hospital and coded as having a cleft lip abnormality from 1995–2000.
- Fetuses with other abnormalities and a cleft lip/palate that had termination of pregnancy at National Women's

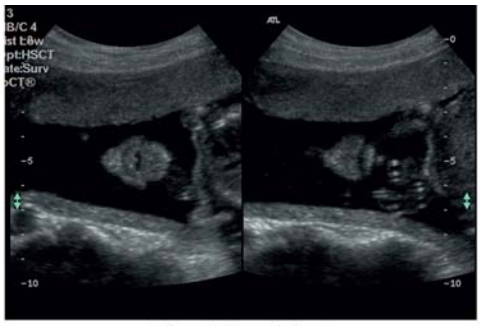
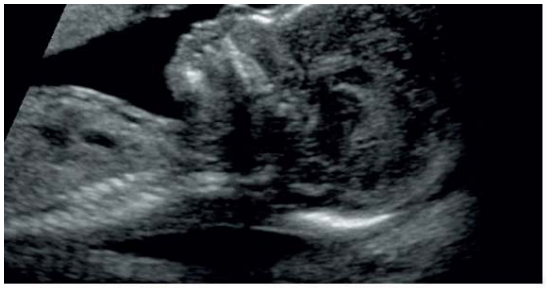


Figure 2 Normal views

Figure 2, 2a Normal views



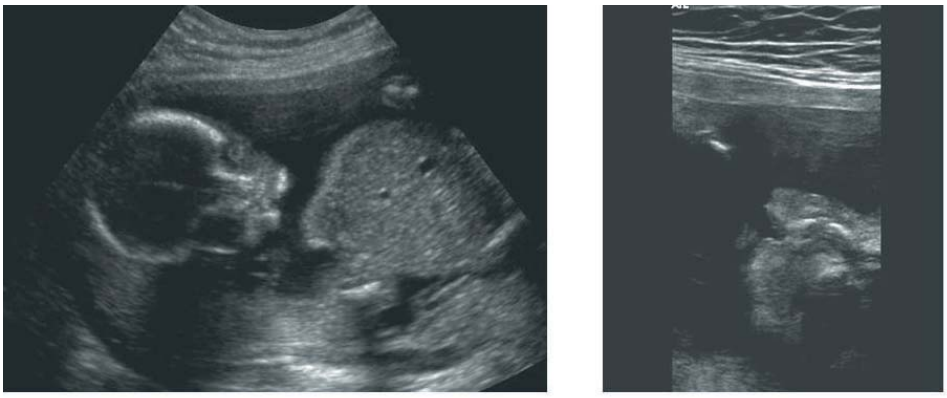


Figure 3 Cleft lip and alveolar ridge involvement

Hospital from 1995–2000. (No fetuses were terminated for isolated cleft lip and/or palate).

- Ultrasound reports were checked on the National Women's Ultrasound Database and patient medical records for reports of scans from private practices.
- Crosschecking was undertaken using the paediatric surgical lists, and post mortem examinations.
- Isolated cleft palate was excluded.

Audit results

- 43,343 babies were born at National Women's Hospital during the study period.
- 48 babies had a cleft lip/palate abnormality and had an ultrasound scan.
- 18 of these babies had other fetal abnormalities; minor abnormalities were excluded.
- There were 8 terminations of fetuses for abnormalities which included a cleft lip (< 20 weeks gestation).
- 7 babies born with a cleft lip abnormality had no records of an antenatal scan.

The prevalence of cleft lip was 1:688 and as an isolated finding the prevalence was 1:1171.

The ultrasound findings were:

52% (26 of 48) babies were identified with a cleft lip before birth.

75% (6 of 8) where cleft lip was present with other abnormalities where identified before termination.

57% (32 of 56) in total were identified antenatally.

Detection rates

	18–20 week scan %	> 24 weeks gestation %
1995–1998	36	40
1999	52	60
2000	64	75
False positive (2 cases 1995–1997)	4	

Discussion

Cleft lip can be detected by ultrasound at the time of the 18–20 week scan, but detection may be limited by the fetal position. Frontal views of the chin, lips, alveolar ridge and the nose are ideal (Figures 2, 3), complemented by the sagittal views of the facial profile, (Figure 4).

There was a better detection rate after 20 weeks gestation, which has been reported by other study groups[5,6]. It may be prudent for high-risk cases to have a repeat scan after 24 weeks gestation,[3,6] and for the lips and face to be examined in detail for those having a repeat scan.

There was an improved detection rate in the year 2000 compared with earlier years which may be due to:

- Education and standardising the facial views at the 18–20 week scan.
- High quality machines now available in the majority of ultrasound practices (private practices and public hospitals).

There are reports that, with the use of three-dimensional ultrasound there could be a higher detection rate[6,7] (Figure

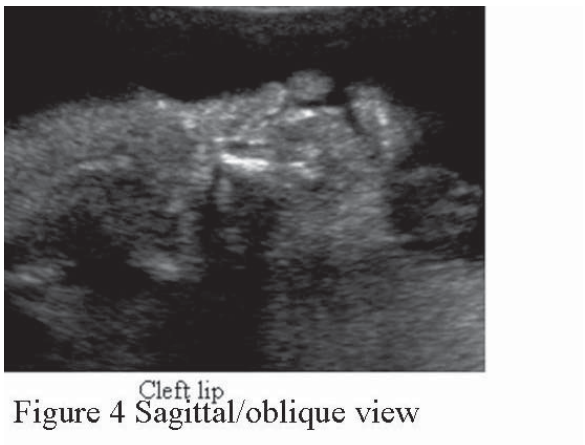


Figure 4 Sagittal/oblique view

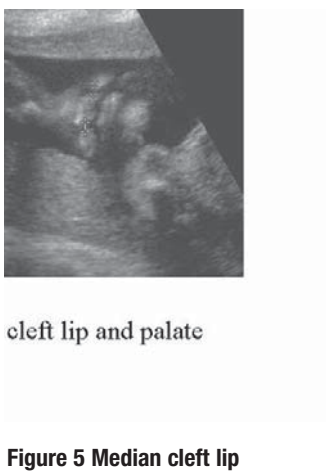


Figure 5 Median cleft lip and palete

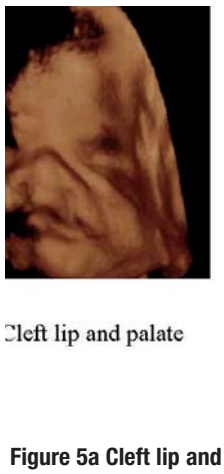


Figure 5a Cleft lip and palete

5).

Our experience demonstrated that 3D can demonstrate the extent of the cleft (Figure 6) and to exclude false positive diagnosis (Figure 7).

The false positive diagnosis for two patients was diagnosing a prominent philtrum.

Conclusions

There was an better detection rate in 2000 than in 1995–1998, which is similar to other international reports[6,7].

International reports suggest that, in high risk cases, an ultrasound examination should be performed at 24 weeks gestation and the use of 3- and 4D may improve detection rates.

It is realistic to assume that cleft lip cannot be diagnosed in all cases, due to fetal position. Parents of children with a cleft lip abnormality that was not detected antenatally should be counselled that there has been an improvement in detection of cleft lip and palate by ultrasound, but not in all cases.

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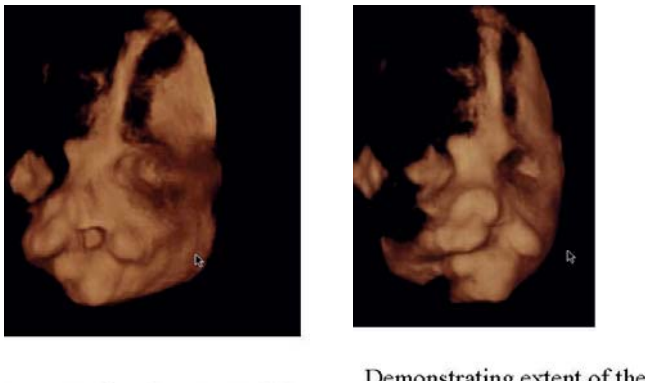
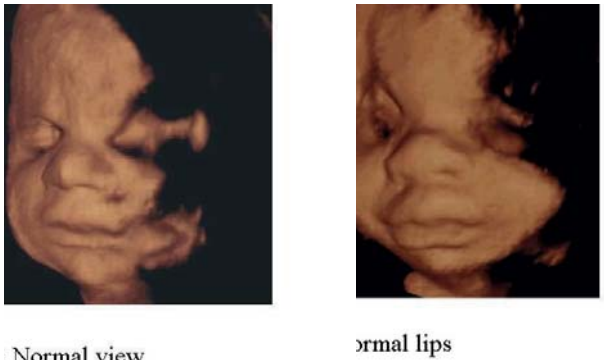


Demonstrating extent of the

Figure 6, 6a Demonstrating the extent of the cleft

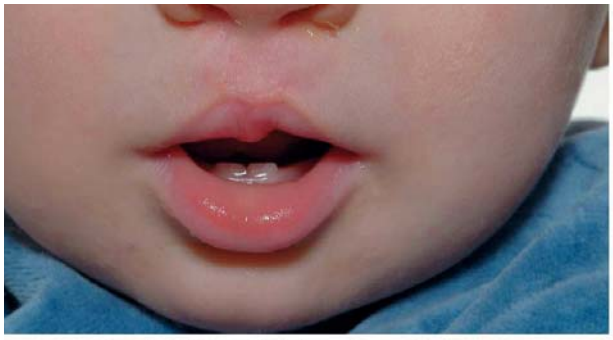


Normal view

Figure 7 Normal view

ormal lips

Figure 7a Normal lips



Repaired bilateral cleft lip 6 months

Figure 8 Repaired bilateral cleft lip at 6 months

Fetal heart assessment for a routine morphology scan

Lynette Hassall
Queensland University of Technology

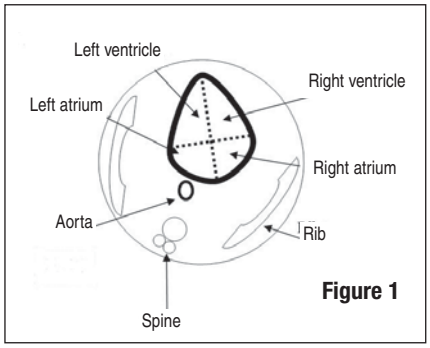


Figure 1

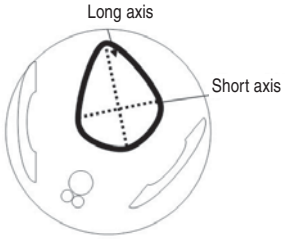


Figure 2

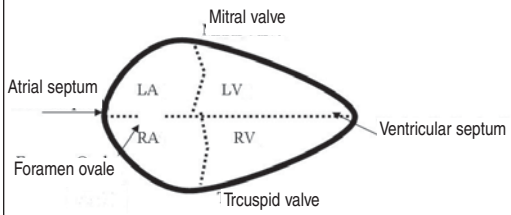


Figure 3

Locate the fetal heart, situated within the fetal chest, lying obliquely to the left, and occupying approximately one-third of the fetal chest. The heart should be assessed for rhythm and contractility in B-mode.

1 A M-mode image is obtained to document fetal heart motion and to measure heart rate.

The right ventricle lies closest to the chest wall. The left atrium closest to spine. The right ventricle is identified morphologically as the right ventricle, not only because of its position closest to the chest wall but also because the tricuspid valve is offset and closest to the apex of the heart, and the moderator band is viewed at the apex of the ventricle as a slight thickening of the wall.

The descending aorta lies posterior to the left atrium.

2 Assess the lie of the fetus, then a split screen image should be taken with:

i) the stomach

ii) four-chamber view, to show the apex of the heart. This image documents that both structures lie to the left side of the fetus – this confirms normal cardiac situs (Figure 1).

Other terms to remember are:

long axis and short axis (Figure 2).

The tricuspid valve separates the right atrium from the right ventricle. The pulmonary artery arises from the right ventricle through the pulmonary valve. The mitral valve separates the left atrium from the left ventricle.

The aorta arises from the left ventricle through the aortic valve. The pulmonary artery crosses over the aorta as it exits the heart.

The valves do not form a true cross with the septa, they are slightly offset, with the tricuspid valve slightly more apical than the mitral valve.

The right and left ventricle should be the same size. The ventricular septum separates the right and left ventricles. It should be intact, at its mid portion it should be of equal thickness to the ventricular wall, and may be slightly thinner as you angle more cephalad.

The right and left atrium should be the same size. The atrial septum separates the right and left atria, with the foramen ovale connecting the atria. The pulmonary veins can be seen entering the left atrium. The inferior vena cava (IVC) inferiorly, and the superior vena cava (SVC) superiorly, enter the right atrium (Figure 3).

The heart images must be optimised individually and the angles of insonance changed for each view.

If you have a fetal cardiac package on your machine, change to this package. If you do not, you need to zoom the image, so the fetal heart fills approximately three quarters of the image, increase the frame rate, and decrease the dynamic range.

3 To image the ventricular septum, you must image the heart at a 90º angle to the septum, approaching from the lateral border of the heart. This will minimise any dropout artifact so you do not create the appearance of a ventricular septal defect (VSD). You must sweep through the heart so you do not miss a small defect in a portion of the interventricular septum (Figure 4, 4a).

4 A colour or power Doppler view may be obtained to demonstrate that the flow in the two ventricles is separate.

5 A four-chamber heart view is obtained, with the probe at

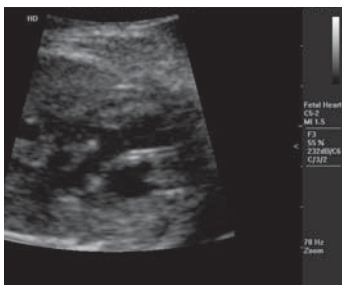


Figure 4

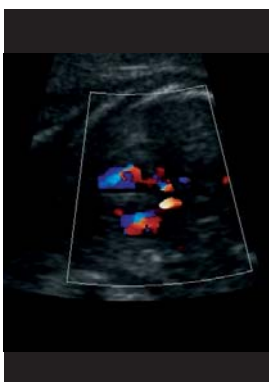


Figure 4a

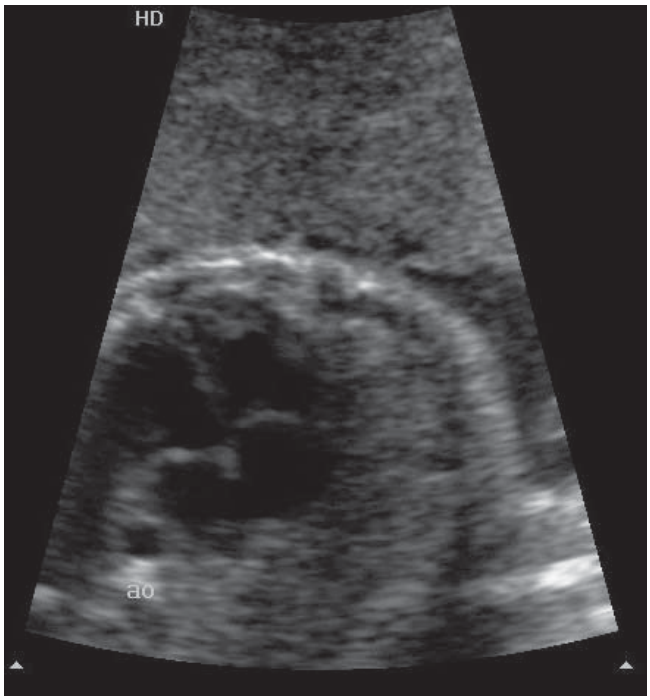


Figure 5

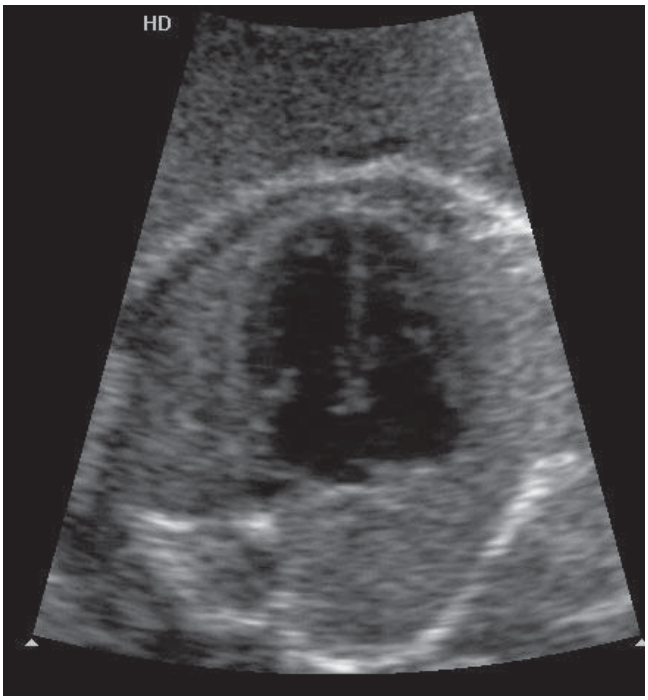


Figure 6

the apex of the heart. This image is obtained ideally with the fetus supine, from the long axis of the heart.
N.B. two images may be obtained at this time:
(i) valves closed (Figure 5).
(ii) valves open (Figure 6).

6 A colour or power Doppler image should be obtained in this same plane to demonstrate no jet or flow directly between the ventricles.

7 From this plane tilt the probe slightly towards the fetal head, pivoting at the apex, and angle up towards the aorta, to assess the left ventricle, aortic valve and aortic outflow tract, labeled LVOT on your image. While you are in this position re-evaluate the ventricular septum as most septal defects occur at the perimembranous region, just inferior to the valves.

The image must show the left ventricular outflow tract and the left ventricle, a measurement can be performed at the level of the valve (Figure 7).

8 Angle the probe slightly more cephalad, once again pivoting from the apex, to visualise the right ventricle, pulmonary valve and right ventricular outflow tract. The aortic root and the pulmonary root should be similar in size. This image must show the right ventricle and outflow tract, labelled RVOT on your image, and a measurement can be taken at the level of the valve. The right and left outflow tracts should be of a similar size (Figure 8).

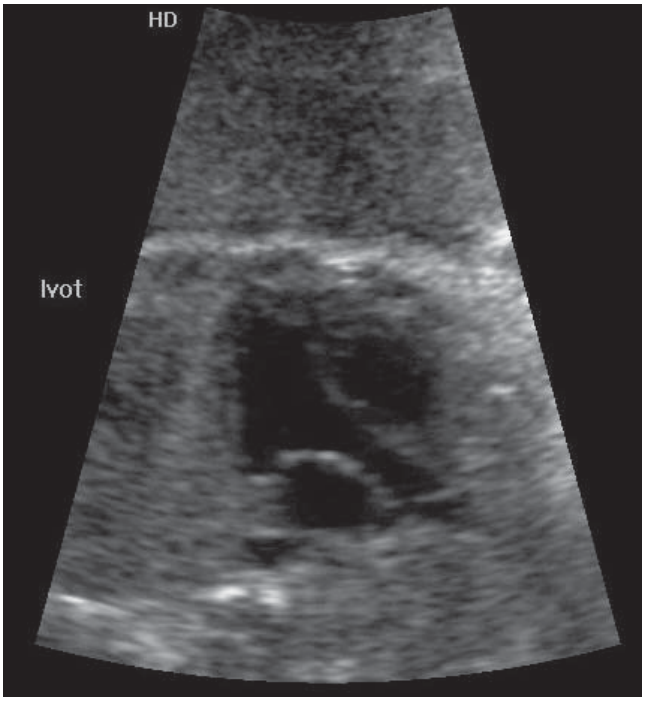


Figure 7

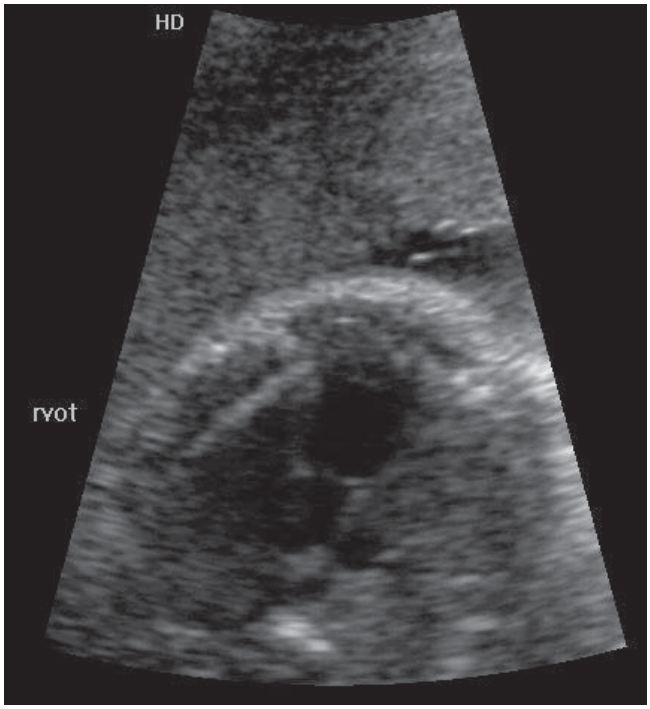


Figure 8

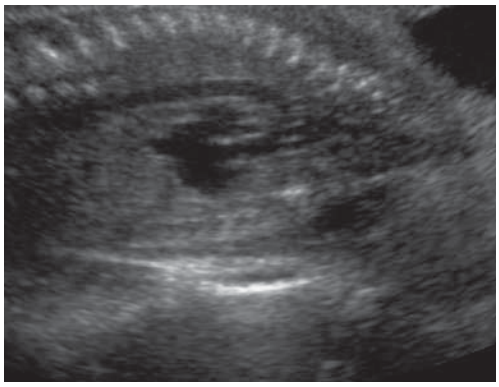


Figure 9

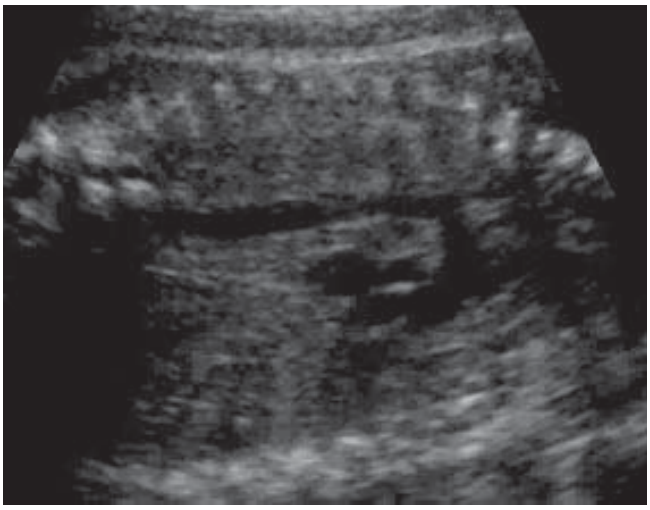


Figure 10

9 A colour Doppler image on a split screen of (i) LVOT and (ii) RVOT should be obtained to clearly demonstrate the crossover of the great vessels as they exit the heart.

10 Rotate the probe so that you are now longitudinal to the fetus, to image the aortic arch in long section. The head and neck arteries arise from the aortic arch. The image must include the left ventricle, aortic valve and arch of the aorta in long section. A 'shepherds crook' appearance, is obvious if you are in the correct plane (Figure 9).

11 A colour or power Doppler image may be used to demonstrate the arteries arising from the aorta.

12 In this probe position, angle slightly toward the descending aorta. The right ventricle with the pulmonary valve, pulmonary artery and patent ductus arteriosus should appear, anterior to the aortic valve and aorta. The ductal arch joins the descending aorta, and the image is described as a 'hockey stick' appearance (Figure 10).

13 A colour or power Doppler image of the ductal arch and aorta may also be taken.

If there is any question as to the normality of the outflow tracts when assessment of the heart is made, the three vessel view and the arrowhead view should also be assessed in the transverse plane.

14 The 3-vessel view is a progression superiorly in the heart from the 4-chamber view. The pulmonary artery is seen coursing over the top of the aorta, with the superior vena cava (SVC) posteriorly. The pulmonary artery and the aorta should be approximately the same size, with the SVC approximately half the size of the aorta (Figure 11).

15 The arrow-head view is slightly more superior to the 3-vessel view, and oblique, and is the view obtained when the ductal arch and the aortic arch join to form the descending aorta (Figure 12).

16 A colour Doppler image view of this view may also be used to document flow in the same direction in both vessels.Each portion of the heart anatomy must be assessed fully and completely, before representative images are taken.

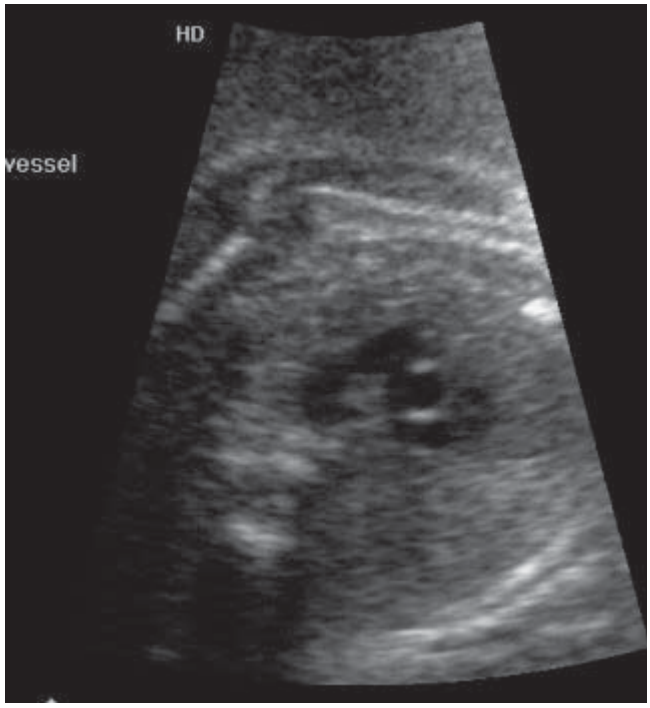


Figure 11

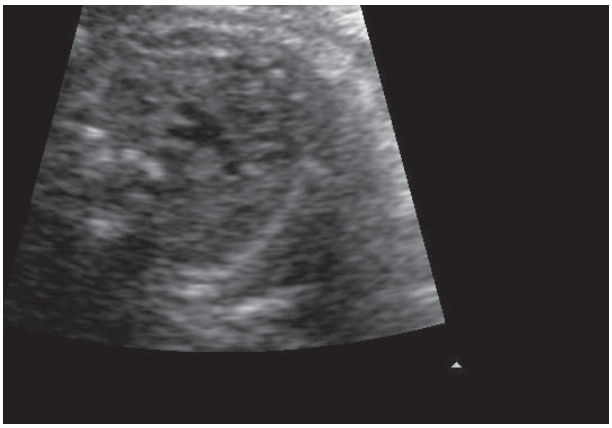


Figure 12

Further reading

ASUM 18-20 Week Obstetric Ultrasound Examination Wall Chart.
Clinical Sonography, A Practical Guide 3rd Edition, Roger C. Sanders.
Ultrasound in Obstetrics and Gynecology 2nd Edition, Eberhard Merz.
Ultrasonography in Obstetrics and Gynecoogy, 4th Edition, Callen.

ASUM Ultrasound Bulletin 2005 February 8: 1: 28–33

Overview of anatomy of the deep and superficial venous system of the lower leg

Debbie Coghlan
Camperdown Vascular Laboratory

The lower limb venous system can be divided into the deep and superficial veins. The deep veins lie below the fascia that separates the muscles from the subcutaneous tissues. The fascial layer is usually visible on an ultrasound image. There are numerous interconnections between the deep and superficial veins via perforating veins.

The deep venous system

Common iliac veins

The common iliac veins, right and left, are formed by the union of the corresponding external and internal iliac veins. The right common iliac vein is much shorter than the left, it lies posterior to the corresponding common iliac artery. The left common iliac vein is much longer than the right, and is placed more obliquely; it passes upwards and to the right, anterior to the body of the fifth lumbar vertebra.

Internal iliac vein

The internal iliac vein begins at the upper border of the greater sciatic notch and ascends to the brim of the pelvis; there it unites with the external iliac vein to form the common iliac vein.

External iliac vein

The external iliac vein is the upward continuation of the femoral vein; it begins on the medial side of the external iliac artery, and ends immediately behind the internal iliac artery, by joining the internal iliac vein to form the common iliac vein.

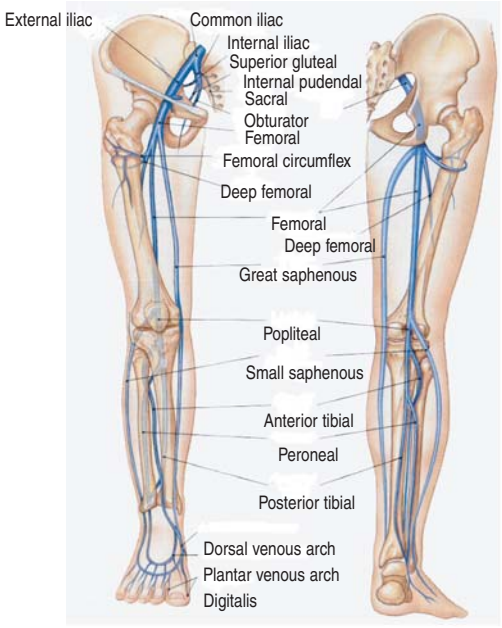


Figure 1 The deep venous system

The femoral vein

The femoral vein is the direct continuation of the popliteal vein, it begins at the junction of the middle and distal thirds of the thigh, at the opening in the adductor magnus muscle, it then ascends, through the adductor canal and lies posterolateral and then posterior to the femoral artery and becomes the external iliac vein.

The popliteal vein

The popliteal vein is formed at the distal border of the popliteus muscle. At its commencement it lies to the medial side of and slightly posterior to the popliteal artery, it them passes through the opening in the adductor magnus muscle and becomes the femoral vein.

Veins of the calf

The soleal sinuses form the main collecting chambers in the calf and these veins empty into larger, valved veins which direct blood from the distal to the proximal posterior tibial and peroneal veins. There are three paired deep veins in the calf which are named after the corresponding arteries: the posterior tibial, peroneal and anterior tibial veins. The posterior tibial and peroneal veins unite to form the tibio-peroneal trunk, this then forms the popliteal artery. The anterior tibial vein joins the distal popliteal vein. The gastrocnemius vein drains the two large gastrocnemius muscles, to form one larger vein which enters the popliteal vein just below the normal insertion of the small saphenous vein (SSV).

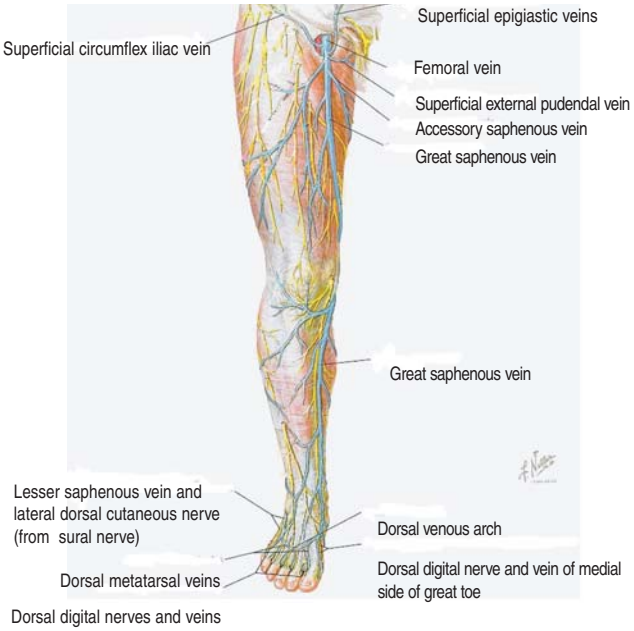


Figure 1a Anatomical image of the great saphenous vein

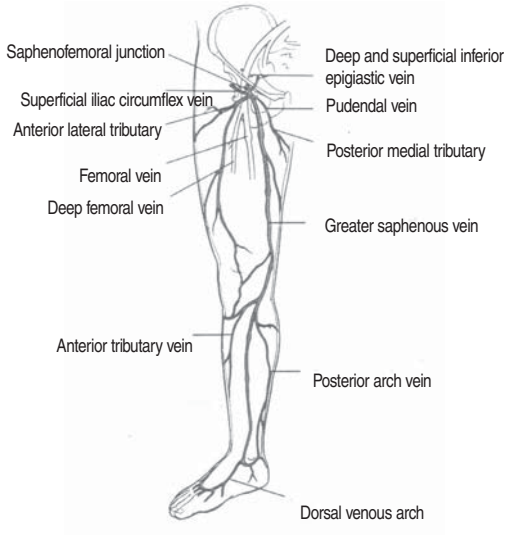


Figure 2a Anterior view showing the tributaries of the LSV

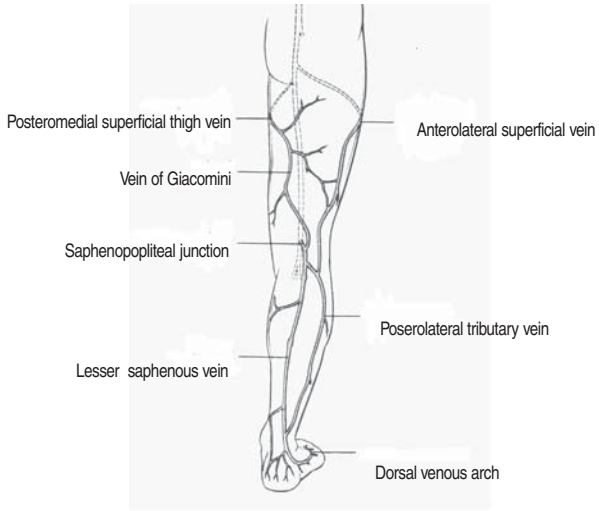


Figure 2b Posterior view showing the tributaries of the LSV

Veins of the superficial system

The superficial veins are located in the subcutaneous tissues external to the deep fascia.

Cadaveric studies have revealed marked diversity in the anatomy of the superficial venous system. The superficial venous system of the lower extremity comprises three systems:

1 The great saphenous (greater saphenous, great saphenous)
2 The small saphenous (small saphenous, lesser saphenous)
3 The perforating or communicating veins

These veins and their tributaries, drain blood from the skin and subcutaneous tissues of the entire lower extremity.

The great saphenous venous system

The great saphenous vein (GSV) (Figure 1a) is the longest vein in the body, it begins in the medial marginal vein of the dorsum of the foot (formed by the union of the dorsal vein of the great toe and the dorsal venous arch of the foot), and ends in the femoral vein about 3 cm below the inguinal ligament. It ascends in front of the tibial malleolus (medial malleolus) and along the medial side of the leg in relation with the saphenous nerve.

It runs upward behind the medial condyles of the tibia and femur and along the medial side of the thigh and, passing through the fossa ovalis, ends in the femoral vein at the sapheno-femoral junction (SFJ). The GSV is often duplicated, especially below the knee. The valves in it number from 10 to 20 and are more numerous in the lower leg than in the thigh.

Tributaries

As it ascends in the leg and thigh, the great saphenous vein receives numerous tributaries and communicates in several locations with the SSV.

At the ankle it drains the sole of the foot through the medial marginal veins. In the leg it communicates freely with the short saphenous vein and deep veins.

Just below the knee it usually has two or three large tributaries, the two most constant of these are the anterior tributary vein (sometimes known as the anterior calf or tibial vein and the 'Posterior arch vein' by Dodd and Cockett (I956) (Figure 2a).

Tributaries from the medial and posterior aspects of the thigh frequently unite to form an accessory saphenous vein,

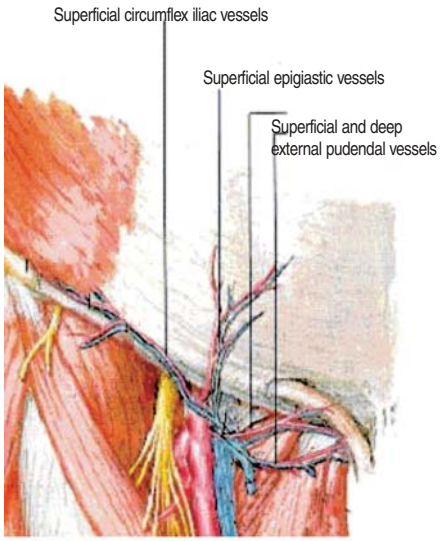


Figure 3a

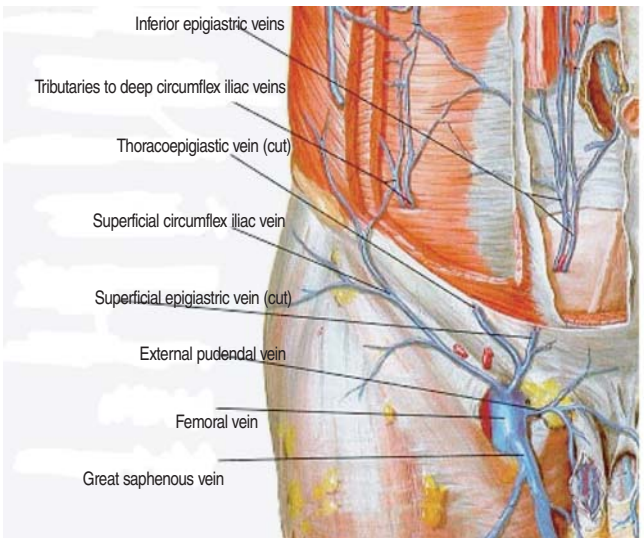


Figure 3b

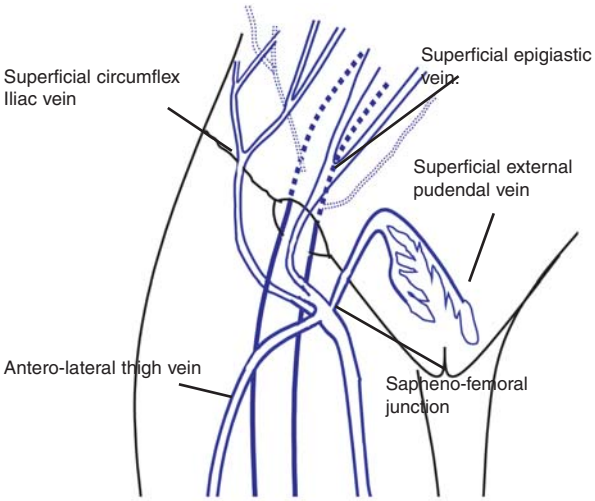


Figure 4 The most common variant

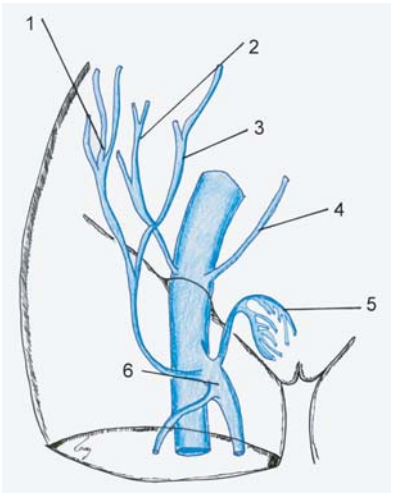


Figure 6 Tributaries of the SFJ

also known as the posteromedial vein of thigh (posteromedial thigh vein (PMTV). This vein often joins the GSV a little way below the SFJ, but can sometimes be seen very close to the junction. It often continues down to join the SSV.

Another constant tributary is the antero-lateral thigh vein (ALTV), this can be found anywhere from the SFJ, to mid thigh. This often courses back into the GSV, or it may terminate in the anterior tributary vein. (Figure 2b). Just before it pierces the saphenous opening at the SFJ it is joined by three veins. (Figure 3a and 3b).

1 The superficial epigastric vein (SEV)
2 The superficial circumflex iliac vein (SCIV)
3 The superficial external pudendal vein (SEPV)

Anatomy in this area can be highly variable, with the above tributaries coursing to the SFJ, as in Figure 3a, alternatively they may course to the common femoral vein (CFV) as in Figure 3b.

Without looking at the previous pages match column A with the veins in column B

Column A	Column B
1	A Sapheno femoral jct
2	B Deep circumflex iliac vein
3	C Superficial external pudendal vein
4	D Superficial epigiastric vein
5	E Superficial circumflex iliac v.
6	Inferiorepigiastric

The sapheno-femoral junction and its tributaries

Below are diagrammatic representations of the variations of the SFJ and its tributaries – images taken from Trevor Beckwith, Charles Sturt University and anatomical repre-

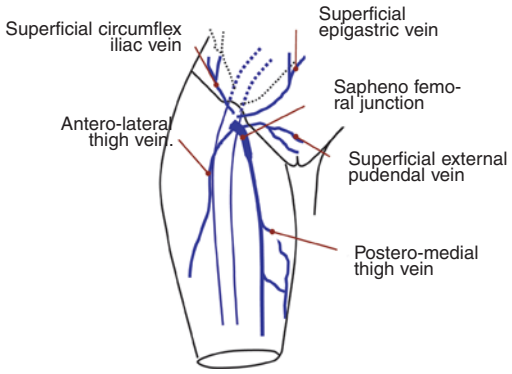


Figure 5 In this example the SCIV and SEV join the common femoral vein

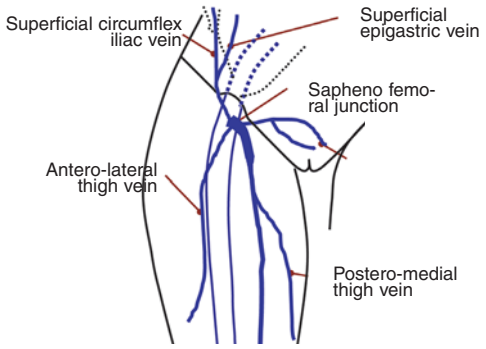


Figure 5b Here the SCIV and SEV join either common femoral vein or SFJ as a common trunk and divide after

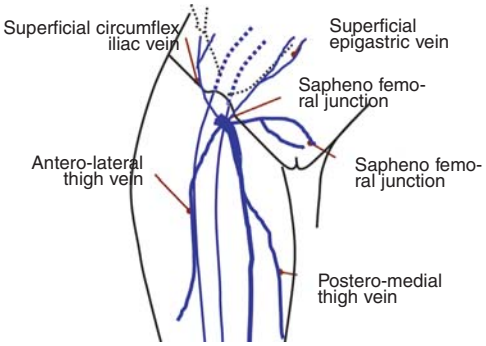


Figure 5c In this example the SCIV and SEV join the SFJ

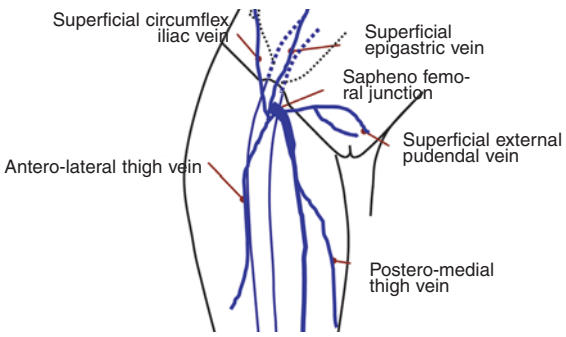


Figure 5d Here the SCIV and the SEV join the ALTV to form a single common lateral tributary

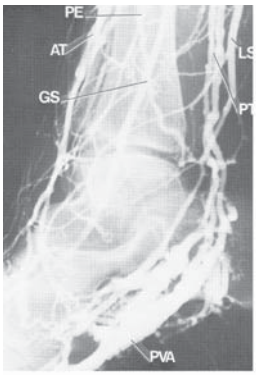


Figure 7 Normal venogram, lateral view of the foot and ankle PE = peroneal; AT = anterior tibial; GS = Greater saphenous; LS = lesser (short) saphenous; PT = posterior ticbial; PVA = plantar arch

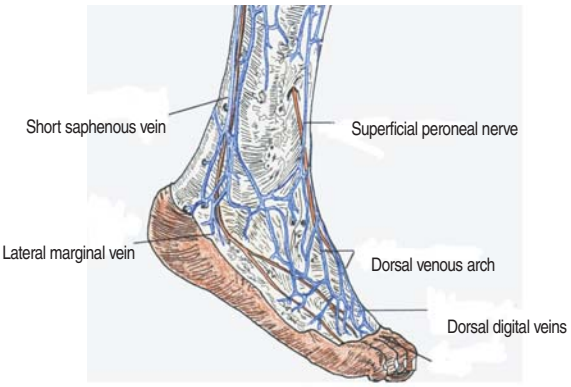


Figure 8 Diagram of the superfial veins of the ankle and dorsum of the foot, anterio-lateral view. Image drawn by D Coghlan and copied from the Grantas Atlas of Anatomy

sentation by Deb Coghlan.

The small saphenous venous system

The small saphenous vein (Figure 8) begins behind the lateral malleolus as a continuation of the lateral marginal vein of the foot (Figure 7). From here arises the SSV, which receives many tributaries that drain blood from the superficial tissues of the posterior and lateral portions of the foot and leg.

The SSV runs from behind the lateral malleolus, perforates the deep fascia and passes between the two heads of the gastrocnemius. The SSV ends in the popliteal fossa and enters the popliteal vein at the sapheno-popliteal junction, superior to the origin of the gastrocnemius vein (Figure 10). The sapheno-popliteal junction is however extremely variable in its level and the short saphenous may not enter the popliteal vein at all.

Sometimes a communicating branch from the SSV just before it pierces the deep fascia, passes upwards and medially to join the GSV (often referred to as the Giacomini vein (Figure 11). This communication may occasionally be the main continuation of the small saphenous. The SSV possesses from 7 to 13 valves, and if it terminates in the popliteal vein, there is usually a valve just near the junction.

The sapheno-popliteal junction

The majority of SSVs terminate at the popliteal vein (Figure 11a), it is not unusual to find the SSV ending in the mid-thigh by communicating with the deep femoral vein (profunda), the superficial femoral vein (SFV), (Figure 11b), the great saphenous vein or PMTV (Figure 11c).

Sometimes the SSV continues up to join the GSV in the groin and occasionally it joins the internal iliac vein via the internal pudendal, gluteal, or sciatic veins (Figure 11d).

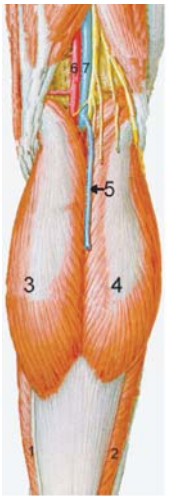
A true sapheno-popliteal junction is present in 60% of the population, with the level of this junction between 2 cm and 7 cm above the knee joint (half of these between 3 cm and 5 cm) (Figure 12).

In another 30% there is no communication to the popliteal vein, but the SSV continues into the thigh and terminates high by joining the GSV, usually via the posterior medial tributary at the groin, sometimes to the profunda or to tributaries of the internal iliac vein.

The remaining 10% terminate in the calf either by joining the GSV or by joining the gastrocnemius vein via a mid-calf perforator.

The perforating veins

The perforators are short, horizontally-running, very small and thin-walled vessels that connect main superficial and main deep veins. The perforating veins connect the superfi-



Key

1	Medial soleal
2	Lateral soleal
3	Medial gastrocnemius
4	Lateral gasrocnemius
5	Short saphenous vein
6	Popliteal artery
7	Popliteal vein

Figure 9 Dissected image of the right posterior calf

Figure 10 Posterior view of the right leg showing the SS terminating into the SPJ

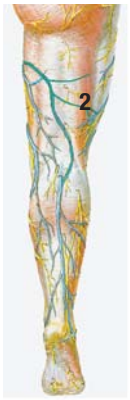


Figure 11 Modified posterior view of the right leg showing the SS and the Giacomini veins coursing through to the inner thigh

Small saphenous vein terminations

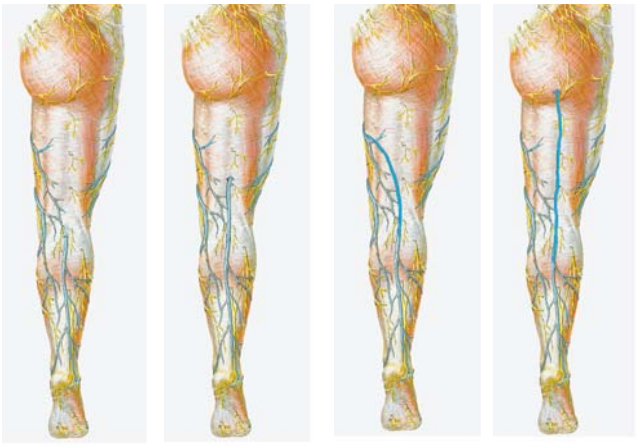


Figure 11a **Figure 11b** **Figure 11c** **Figure 11d**

11a Posterior view showing the SS terminating into the popliteal vein
11b Modified posterior view showing the SS terminating into the SFV
11c Modified posterior view showing the SS termination into the GS or PMTV
11d Modified posterior view showing the SS termination into the pudendal, gluteal or sciatic veins

cial and the deep veins, while connections within the region of the superficial or the deep veins are made by the communicating veins.

The perforating veins link the deep and superficial systems and usually function to carry blood from the superficial system to the deep veins. Valves in these veins, when competent, prevent reflux of blood from the deep to superficial veins.

The perforating veins are often referred to by the proper names of the anatomists who first described them. They proceed through all the vascular regions of the extremities. Of the 95 groups described by Van Limborgh (1963), only 18 groups, the majority of which are located in the lower leg, have clinical significance (Weber and May 1990, p. 349).

In the lower leg, eight groups are distinguished, including the medial, lateral, and posterior perforating veins, with Cockett veins, I, II, III (Figure 13) having the greatest significance.

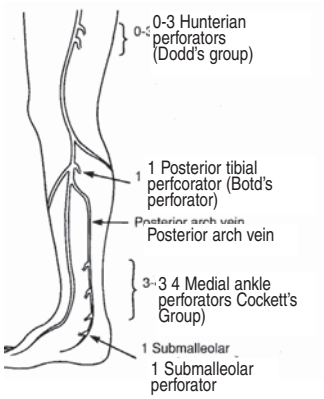


Figure 13 Sites of the important perforator veins connecting the deep and superficial venous systems

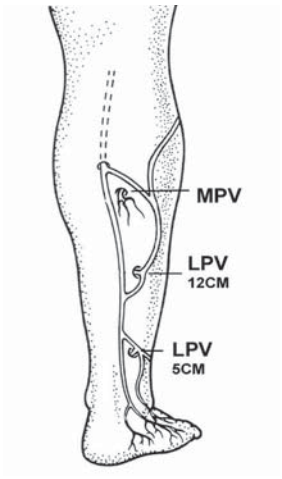


Figure 14 Perforating veins of the posterior and lateral calf

Medial calf perforating veins

The Cockett perforating veins lie in a defined region above the sole of the foot, and connect the GSV with the posterior tibial veins distally:

Cockett I 7 ± 1cm
Cockett II 13.5 ± 1cm
Cockett III 18.5 ± 1cm

The group termed the Boyd perforating vein is also well known. It lies approximately a hand's breath (10 cm ± 1 cm) below and medial to the knee joint, and is important because of its potential to supply the great saphenous vein in case of insufficiency.

Lateral and posterior calf perforating veins

It is difficult to find exact names for these lateral calf veins, but they are usually described by their position in the calf. Figure 14 shows the more constant lateral and posterior calf perforating veins.

There is a constant perforator emerging close to the insertion of the gastrocnemius into the soleus tendon. This has been described as the midcalf perforating vein (MPV).

Another two fairly constant perforating veins are located

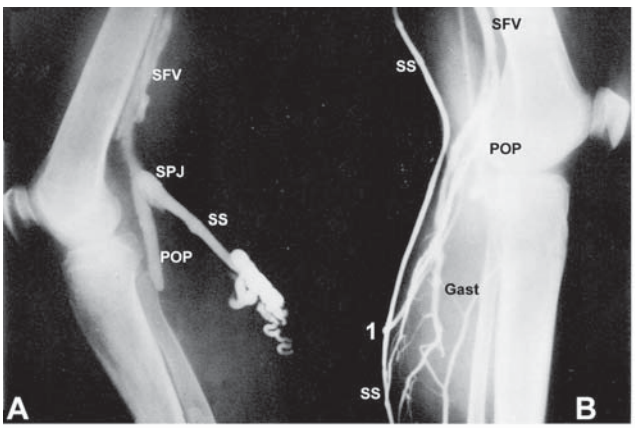


Figure 12 A – Venogram showing typical SPJ – with varicosities of the SS. B – Venogram showing SS continuing up to the tributary of the GS, with no communication to the popliteal vein, the gastrocnemius veins are filled via the mid-calf perforating vein

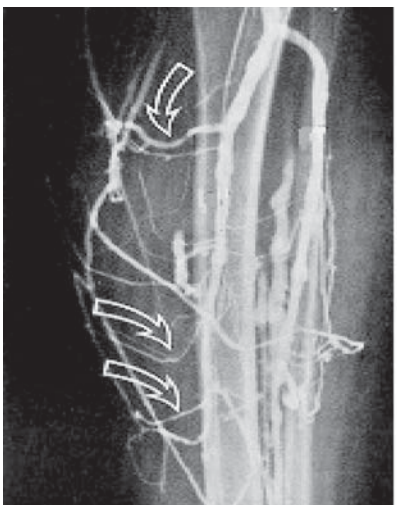


Figure 15 Venogram showing the calf perforating veins joining the superficial veins to the deep veins (open arrows)

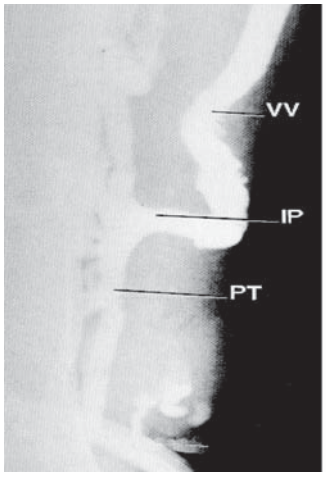


Figure 16 PT= posterior tibial vein IP = incompetent perforator VV= varicose vein. Venogram demonstrating an incompetent calf perforator (coursing from the deep vein to the superficial

slightly lateral to the SSV, at 5 cm and 12 cm above the sole of the foot – lateral perforating veins (LPV).

Thigh perforating veins

The veins of the thigh are also divided into three main groups: the medial, lateral and posterior perforating veins.

The clinically most important blood vessels here are the Dodd perforating veins, which are located at the medial distal thigh, (Figure 13) and connect the great saphenous vein to the femoral vein.

Ultrasound images of the perforating veins

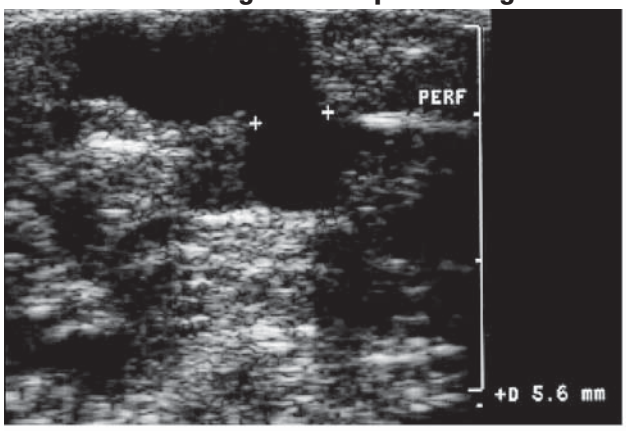


Figure 17a B-mode ultrasound image showing a large incompetent calf perforator, coursing through the superficial facia to the deep veins

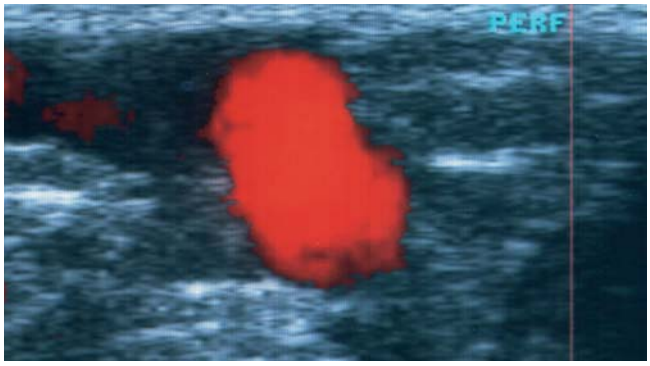


Figure 17b B Colour ultrasound image of the same perforator in figure 17a showing the reversed flow (from the deep veins to the superficial veins

Sonographer's Observations: Abdomen

Proforma

Name ..... D.O.B .....

URL or ID Number Fasting ❑ Yes ❑ No

AORTA

Transverse dimensions (cm)	
AP Diameter (cm)	

Wall calcification	
Paraortic region	

Comments .....
.....

PANCREAS

Visualised	Not Visualised	Due to:	Bowel gas	Patient body habitus	Other
Normal head		Normal body		Normal tail	
Cystic or Solid Masses		Absent		Present	
Echogenicity / Echotexture			Pancreatic Duct:	..... mm	Not seen

Comments .....
.....

GALL BLADDER

Normal		Contracted	
Calculi	Polyps	Size (mm)	
Wall thickness (mm)		Cholecystectomy Y/N	Sludge Y/N
Sonographic Murphys' sign		Positive	Negative
GB vascularity		Increased	Normal

Comments .....
.....

CBD

Visualised			
Size (mm)			
Intraluminal calculi	Yes	Sive (mm)	No

Comments .....
.....

LIVER

Length, midclavicular, supine (cm)	Contour Irregularity Y/N	Surface Nodularity Y/N
Echotexture	Uniform / Focal alteration / Fatty Liver	
Echogenicity compared to Rt Kidney	Normal / Increased / Reduced	
Cystic or solid masses		
Intra-hepatic ducts	Not Dilated	Dilated

Comments .....
.....

	RIGHT KIDNEY			**LEFT KIDNEY**		
Length (cm)						
Hydronephrosis						
Focal masses						
Cysts						
Cortex	NAD	Scarring	Thinning	NAD	Scarring	Thinning
Calculi						

Comments .....
.....

SPLEEN

Size (cm)			
Echotexture			
Focal lesions			
Pleural effusion L/R	Free Fluid		
R/L Subphrenic	Pelvis	RLQ	LLQ

Comments .....
.....

Any further comments

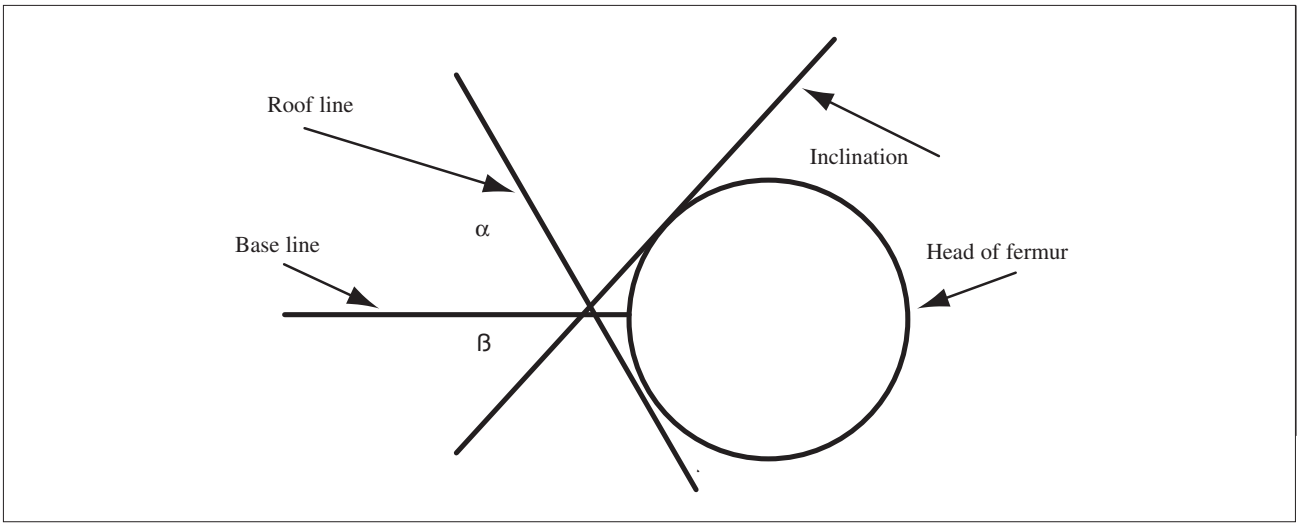
.....

Diagrams or Drawings Yes / No / PTO

Sonographer ..... Date .....

Sonographer's Observations: Neonatal hip ultrasound *Proforma*

NAME		
MRN		
CASE No.	Date...../...../.....	DOB...../...../.....



	α	β	FHC %	CONCLUSION
Rt HIP				
Lt HIP				

Graf'sClassification	α	β	**Consequences**
Type 1	> 60	< 55	No Therapy
Type 2a	50–59	> 55	Physiological immaturity < 3 months old – Follow up
Type 2b	50–59	> 55	> 3 months – Treatment
Type 2c	43–49	< 77	Critical Zone
Type 2d	43–49	> 77	Subluxed – labrum everted
Type 3	< 43	> 77	Dislocated
Type 4	< 43	> 77	Trapped between femoral head and ilium – treatment

FHC	**Consequences**
> 50%	Normal
49–40%	Possible dysplasia in newborns
49–40%	Dysplasia in infants greater than 4 months
39–10%	Subluxation
< 10%	Dislocation

SONOGRAPHER
Date...../...../.....

Note: this proforma was published in the May 2004 issue Vol 17: 2. It is republished to correct the placement of ß in the original diagram

ASUM DMU Board of Examiners'Report

Ros Savage

New format for the Part II DMU Examinations

From 2006 the Objective and Standardised Clinical Examinations (OSCE) will no longer be held, being replaced by an Oral Film Reading Examination.

It has been the trend over the past few years that candidates pass the clinical OSCE stations well but fail to demonstrate an understanding of the physical principles governing ultrasound in the setting of an OSCE examination. Ultrasound images reflect a number of these physical principles in the form of artifacts, some of which are useful and some of which can lead us to an incorrect conclusion. To become successful as a sonographer candidates must be able to recognise these artifacts for what they are.

The ASUM Council and the ASUM DMU Board of Examiners feel that a face-to-face discussion of images will allow the Examiners to truly judge the knowledge and understanding of a candidate, not just whether the question has been read correctly in the stressful environment of an examination. The Examiners will be able to ask the same question in a different manner if they feel that the candidate has missed the point of a question or is simply too nervous to show their knowledge adequately.

Although these new examinations will mean long hours of work for the Examiners, we feel that it will benefit the candidates and is well worth the extra effort.

2004 Examination Report

The 2004 examinations are now completed and the preparations for the 2005 DMU examinations are well under way.

ASUM offers the DMU examinations annually.

The Part I Examination is now offered twice annually and consists of two written papers comprised of multiple-choice questions (MCQ):

1 Physical Principles of Ultrasound and Instrumentation (PHY); and
2 Anatomy, Embryology, Physiology and General Principles of Pathology (APP).

A pass is required in both papers to successfully complete the DMU Part I Examination. The emphasis of the DMU Part I Examination is on anatomy, the basic principles of ultrasound and instrumentation and on the basic subjects required in ultrasonography, as detailed in each of the four speciality syllabi.

One-hundred-and-five candidates presented for the 2004 Part I DMU Examinations; the final numbers are as laid out in Table 1

Part I Candidates

The Part II Examination is offered once annually and consists of three components:

1 A Written Paper on ultrasound techniques, which may include: patient care, scanning techniques, organ specific pathology, complementary imaging examinations, and all subjects of Part I, including physical principles of ultrasound and instrumentation. This Written Paper consists of multiple choice questions (MCQ) and written essay questions.
2 A Practical Examination in scanning techniques, which includes: patient care, instrumentation, documentation and report handling. Two patients are scanned and five case studies are presented and discussed with the Practical Examiners.
3 The Objective and Standardised Clinical Examination (OSCE) and Oral Examination, which may include any or all of the above subjects. The OSCE is in two sections comprising clinical and applied physics answers stations. The Oral Examination consists of applied physics and clinical related situations. This section of the Part II Examination will be replaced with the Oral Film Reading Examination from 2006.

Candidates must achieve satis-

Table 1 Part I Candidates

Location	Cardiac	General	Obstetric	Vascular	Total
NZ	6	25	0	2	33
Qld	10	0	1	3	14
NSW	5	15	0	1	21
Vic	11	6	0	3	20
Tas	0	0	0	1	1
SA	0	0	0	0	0
WA	3	12	0	0	15
NT	0	0	0	0	0
ACT	0	1	0	0	1
Total	**35**	**59**	**1**	**10**	**105**

Table 2 Part II Candidates

Location	Cardiac	General	Obstetric	Vascular	Total
NZ	8	22	1	3	34
Qld	10	3	0	1	14
NSW	9	8	4	3	24
Vic	13	2	1	3	19
TAS	0	0	0	1	1
SA	5	0	0	0	5
WA	5	6	0	0	11
NT	2	0	0	0	2
ACT	0	0	0	1	1
Total	**52**	**41**	**6**	**12**	**111**

factory standards in all sections of the examination to satisfactorily complete their DMU. The emphasis of the DMU Part II Examination is on the technical and practical considerations of the profession of ultrasonography.

Part II Candidates

One-hundred-and-eleven candidates presented for the 2004 Part II DMU Examinations; the final numbers are laid out in Table 2.

DMU Practical Examiners attended 103 Practical Examinations through Australia and New Zealand and 97 candidates attended the Objective Structured Clinical Examinations (OSCE) and Oral Examinations on either Saturday 16th October (Cardiac and Vascular) or Saturday 23rd October (General and Obstetric).

The Cardiac OSCE/Orals were conducted in Melbourne and Brisbane; the General OSCE/Orals were conducted in Christchurch, Sydney and Perth; the Vascular OSCE/Orals were held in Sydney; and the Obstetric OSCEs were conducted in Sydney.

2004 was the first year that the ASUM DMU Board of Examiners offered a more flexible Part II Examination format where all candidates, regardless of their results in the written examinations, were able to present for their Practical and OSCE/Oral Examinations. In addition, candidates could elect to sit the Written Examination only and defer the sitting of their Practical and OSCE/Oral Examinations to a later year.

Another first was achieved in 2004 with the introduction of external, certificated Practical Examiner Accreditation. Over the next two years all DMU Practical Examiners will be required to attend this Practical Examiner Assessor Training. ASUM Council approved and funded this three-year program to ensure that the best possible standards can be maintained. Assessor Training is being offered at the ASUM Annual Scientific Meetings and Multidisciplinary Workshops in 2005 and 2006, as well as the joint ASUM NZ Branch and RANZCR Meeting in Wellington, New Zealand in July 2005.

The DMU examinations constitute a major operation that could not possibly be achieved without the generous and professional assistance given by an army of volunteer examiners. In 2004, 105 sonographers, doctors, scientists and practice managers assisted the ASUM DMU Board of Examiners as Practical Examiners, Markers, Examination Supervisors and OSCE/Oral Examiners in over 49 locations throughout Australia and New Zealand.

The breakdown of Part II candidature is laid out in Tables 3–6.

For 2004 and 2005, the oral section of the DMU Examination is relatively limited, having been re-introduced in 2004, but from 2006, the ASUM DMU Board of Examiners will again hold full Oral Examinations.

Table 3 Part II Cardiac numbers by location and examination

CARDIAC	Written Only	WRIT*, PRAC & OSCE	PRAC** Only	OSCE*** Only	PRAC & OSCE	Total
NZ	0	7	1	0	0	8
Qld	0	8	2	0	0	10
NSW	1	7	1	0	0	9
Vic	1	11	0	1	0	13
SA	0	5	0	0	0	5
WA	0	3	1	0	1	5
NT	0	2	0	0	0	2
Total	**2**	**43**	**5**	**1**	**1**	**52**

*WRIT – Written Examination **PRAC – Practical Examination ***OSCE – Objective Structured Clinical Examination and Oral Examinations

Table 4 Part II General numbers by location and examination

General	Written Only	WRIT*, PRAC & OSCE	PRAC** Only	OSCE*** Only	PRAC & OSCE	Total
NZ	0	20	1	0	1	22
Qld	0	1	1	1	0	3
NSW	0	6	2	0	0	8
VIC	0	2	0	0	0	2
WA	1	4	1	0	0	6
Total	**1**	**33**	**5**	**1**	**1**	**41**

Table 5 Part II Obstetric numbers by location and examination

Obstetric	Written Only	WRIT*, PRAC & OSCE	PRAC** Only	OSCE*** Only	PRAC & OSCE	Total
N.Z.	0	1	0	0	0	1
NSW	0	3	0	1	0	4
VIC	0	1	0	0	0	1
Total	**0**	**5**	**0**	**1**	**0**	**6**

Table 6 Part II Vascular numbers by location and examination

Obstetric	Written Only	WRIT*, PRAC & OSCE	PRAC** Only	OSCE*** Only	PRAC & OSCE	Total
NZ	0	2	1	0	0	3
Qld	0	1	0	0	0	1
NSW	0	1	0	2	0	3
Vic	0	2	0	0	1	3
ACT	0	1	0	0	0	1
Tas	0	1	0	0	0	1
Total	**0**	**8**	**1**	**2**	**1**	**12**

Part I Examination results

One-hundred-and-five candidates presented for the Part I examinations (Cardiac – 35, General – 59, Obstetric – 1 and Vascular – 10). The overall standard is comparable to previous years. Ninety-two candidates sat the APP paper and 82 passed. This represents an 89% pass rate, with the overall APP mean percentage mark of 65%. One hundred candidates sat the PHY paper and 81 passed, representing an 81% pass rate, with an overall PHY mean percentage mark of 69%.

The Part I Examination results provides a break down of the num-

bers by speciality. Direct comparisons should be avoided since only the Physical Principles of Ultrasound and Instrumentation (PHY) paper is common to all candidates (Table 7).

Cardiac Part I

Cardiac candidates are to be congratulated on their APP knowledge, with a 100% pass rate. Most candidates also demonstrated good theoretical knowledge in Physical Principles of Ultrasound and Instrumentation, with 82% passing. Interestingly, the mean score for both exams was very similar (APP 70%, Physics 71%), reflecting the dedication of candidates to obtain a grasp of both subjects.

General Part I

The Part I Examination was handled quite well by the majority of the General candidates. Significantly, candidates appear to be better prepared for the common PHY paper, where more candidates passed and with a higher average score than the APP paper (mean APP 66%, PHY 69%).

Obstetric Part I

It would be difficult to draw many conclusions from the Obstetric APP and PHY Examination. The single candidate did well and, interestingly, scored better at the Physic (PHY) than the Anatomy (APP). This appears to be a common theme with most specialties. Perhaps candidates are preparing better for the PHY because the standard of the examination was of a very similar level of difficulty to previous years.

Vascular Part I

Eight candidates sat their DMU Vascular Part I Examination in July 2004. Seven candidates (88%) passed.

All candidates demonstrated adequate knowledge in the APP, with all achieving a pass. The mean percentage pass mark was 68%. The majority of candidates also performed well in the PHY section of the examination.

One candidate was exempt from the PHY examination and six of the seven candidates who sat passed. The mean percentage pass mark was 65%.

Part II Examination results

One-hundred-and-eleven candidates presented for the Part II examinations (Cardiac – 52, General – 41, Obstetric – 6 and Vascular – 12) and the overall standard is generally comparable to previous years.

The ASUM DMU Board of Examiners notes, however, that the standard of Applied Physics was down on previous years and urges candidates to look to better preparation in this area.

Physic Workshops are presented annually through the Branches during May/June. The DMU Preparation Course, running this year in conjunction with the Multidisciplinary Workshop, presents intensive Physical Principles of Ultrasound and Instrumentation lectures and workshops. In addition, 11 DMU Physics Modules will be available on-line, through the ASUM website, from March at no cost to candidates enrolled in the DMU examinations.

The Part II results are laid out in Table 8.

Part II Examination results Cardiac – Part 2

2004 saw a new format in Part II examinations, with all candidates presenting for all three components of Part II regardless of their status in the Written Examination. In the Written Examination, 64% of candidates were awarded a passing grade (Table 9). Most answers relating to clinical knowledge were of a high standard. The new compulsory component, 'Legal and Ethical Studies' represented a few candidates' shortcomings, alongside concepts relating to ultrasound principles and instrumentation.

This phenomenon was repeated again in the OSCEs, where all unsuccessful candidates failed the physics section. Everyone passed the clinical stations, again representing high levels of clinical knowledge. The physical

Table 7 Part 1 Examination results

Part I	Number Enrolled	% of Total Candidature	Number Passed	% Passed	Mean (%)
Cardiac	**35**	**33**			
APP*	34		34	100	70
PHY**	33		27	82	71
General	**59**	**56**			
APP	48		38	79	66
PHY	56		45	80	69
Obstetric	**1**	**1**			
APP	1		1	100	62
PHY	1		1	100	68
Vascular	10	10			
APP	8		8	100	68
PHY	9		7	78	65
Total	**105**				

*APP Anatomy, Physiology and Pathology
**PHY – Physical Principles of Ultrasound and Instrumentation

Table 8 Part II Examination results

Part II	Number Enrolled	% of Total Candidature	Number Passed	% Passed
Cardiac	**52**	**48**		
Writ	45		29	Prac
Prac	49		43	88
OCSE	45		32	71
General	**41**	**37**		
Writ	34		30	88
Prac	39		34	87
OSCE	**35**		**30**	**86**
Obstetric	**6**	**5**		
Writ	5		4	80
Prac	5		4	80
OSCE	6		5	83
Vascular	**12**	**10**		
Writ	8		5	63
Prac	10		9	90
OSCE	11		7	64
Total	**111**			

principles relating to colour Doppler and artifacts were commonly misunderstood.

A huge 90% of candidates passed the practical component of the examination, representing the highest practical pass mark across all specialties.

One particular area in the Practical Examination which could be improved, is image optimisation, but most candidates demonstrated good standards of echocardiographic skills, and many bravely included relatively complex Doppler techniques such as regurgitant fractions and PISAs in their examinations (Table 9).

Cardiac Written Questions

In the Written Examination, 64% of candidates were awarded a passing grade.

Question 1: Legal and Ethics/ Multiple focal zones and frame rates

Most answers relating to clinical knowledge were of a high standard. The new compulsory component, 'Legal and Ethical Studies' uncovered the shortcomings of a few candidates. All candidates should remember that the clinical applications of echocardiography require consideration of the patient in a health care context, as well as involving the application of knowledge of the physical principles of ultrasound.

Question 1 was specifically concerned about the optimisation of multifocal zones and the improvement of frame rate in the context of a particular type of clinical scenario.

Question 2: Diastolic function

Question 2 was concerned with an assessment of diastolic function. 97% of candidates attempting this question handled it well. The average mark of 76% is evidence of this.

Question 3: Mitral regurgitation

This question was concerned with mitral regurgitation. Again, most answers relating to clinical knowledge were of a high standard with 81% of candidates passing this question.

Question 4: Tetralogy of Fallot

Question 4 was concerned with Tetralogy of Fallot. As in the other clinical knowledge questions, the majority of answers were of a high standard.

Cardiac Practical Examination

A large 88% of candidates passed the practical component of the DMU Part II Examination, reflecting the very high clinical scanning standard of the candidature. One particular area in the Practical Examination, which could be improved, is image optimisation. Notwithstanding this, most candidates demonstrated good standards of echocardiographic skills, and many bravely included relatively complex Doppler techniques, such as regurgitant fractions and PISAs, in their examinations.

All candidates need to be aware of the ASUM guidelines and protocols when performing their scans. All candidates are assessed according to ASUM standards and candidates must demonstrate an ability to perform techniques included in the ASUM guidelines but which may not part of their departmental protocols eg. M-mode measurements in echocardiography.

Often candidates need to prepare mentally for their Practical Examinations; the best way to achieve this is to practise scanning under examination conditions, ideally with their supervisor and another sonographer which whom they are not familiar.

Cardiac OSCE and Oral Examination

Poor results seem to correlate with a lack of understanding of physical principles. This phenomenon was repeated again in the OSCEs, where all unsuccessful candidates failed the physics section. All candidates passed the clinical stations, representing the high levels of clinical knowledge. The physical principles relating to colour Doppler and artifacts were commonly misunderstood.

Many thanks go to all of the volunteers and ASUM staff involved in organising, supervising, marking and travelling to the cardiac exams. Your willingness to help and your knowledge and professionalism are sincerely appreciated.

Cathy West
Louise Morris
Cardiac ASUM DMU Board of Examiners

Part 2 General

The pass rate for the General Written Paper was similar to previous years. Future candidates are reminded to read all the questions and answer as

Table 9 Cardiac – Part 2

Section	Topic	Candidates Pass/Presented	Pass Rate %	Mean Grade %
MCQ	Clinical Knowledge and Applied Physics	45/45	100	78
Q1 Compulsory	Legal and Ethics / Multiple focal zones and frame rates	37/45	82	56
Q2	Diastolic function	33/34	97	76
Q3	Mitral regurgitation	30/37	81	57
Q4	Tetralogy of Fallot	13 /20	65	51

Table 10 General – Part 2

Section	Topic	Candidates Pass/Presented	Pass Rate %	Mean Grade %
MCQ	Clinical Knowledge and Applied Physics	34/34	100	69
Q1 Compulsory	Legal and Ethics / Pelvic inflammatory disease	32/34	94	68
Q2	DVT study	19/19	100	76
Q3	Amniotic fluid	20/22	90	73
Q4	Gallbladder	25/27	93	62

directed. Marks cannot be given for correct information, if it has not been asked in the question (Table 10, previous page).

General Written Questions

Question 1: Legal and Ethics/Pelvic inflammatory disease
Overall, the compulsory question was generally well handled. The question on acute pelvic inflammatory disease (Parts 1–4) was well answered by the majority of candidates, although ultrasound descriptions of acute PID were poorly answered.

The Legal and Ethical section (Part 5) was not particularly well done. While most candidates demonstrated an understanding of basic ethics principles, a large proportion generally failed to accurately identify the main focus of the question (which was concerned with record keeping/medical records). Simply listing or discussing every ethics principle was inadequate for this question.

Question 2: DVT study
This question was concerned with a DVT study. While all candidates who attempted the question passed there were some areas that require extra work. Part A – describing the DVT scan was well handled by all candidates. Unfortunately, most candidates did Section B poorly. While sonographical differentiation between old and new thrombus is not technically difficult, most candidates seemed to have trouble explaining it. The fourth and fifth sections dealing with the superficial venous system and the femoral vein were generally well handled. Part E, dealing with the risk factors in the development of DVT showed that most candidates were familiar with the topic but they did not expand on their understanding of the risk factors.

Question 3: Amniotic fluid
The question was concerned with amniotic fluid. In the majority of cases, this was answered well. Candidates were familiar with both methods of measuring amniotic fluid and the abnormalities that can be associated with oligohydramnios and polyhydramnios.

Question 4: Gallbladder
The Gallbladder question was a question in five parts. While the question was reasonably well answered in most cases with four of the five candidates passing the question, there are common areas of concern. Section A dealt with how the scan would be conducted. This was well handled by most candidates and the poor responses made no mention of harmonics nor positional changes and their purpose.

Part B dealt with colour Doppler and most candidates handled this section relatively poorly. There appeared to be a general lack of understanding of the use of colour or the Doppler angle required. Common omissions were no mention of colour box size and reasoning; and no mention of angle for colour and PRF settings.

Most candidates handled Part C well. Poor responses did not take into account the measurement for a thickened wall or made no mention of the possibility of impacted calculi, peri cholecystic fluid and Gb distension.

Part D became a discriminating question. The candidates who handled this well did well. Weak responses made no mention of the lack of calculi in acalculus cholecystitis, ring down artifact, fluid in or around wall and made no attempt at emphysematous Cholecystitis.

General Practical Examination
The pass rate for the General Practical Examinations was good with 87% of candidates successful. All candidates need to be aware of the ASUM guidelines and protocols when performing their scans. All candidates are assessed according to ASUM standards; candidate must demonstrate an ability to perform techniques included in the ASUM guidelines but which may not part of their departmental protocols eg. fetal M-mode in mid-trimester obstetrics and M-mode measurements in echocardiography.

With the increasing use of machines capable of compound imaging and harmonics, candidates need to know how best to optimise images on their machines with a working knowledge of the different options. They must be aware of how these technologies affect image interpretation and acquisition and the most appropriate uses of this information. Basic scanning technique using appropriate focus, Field of view and TGC are mandatory.

Candidates should give some thought to the protocols they follow when scanning and must be able to discuss these with the Practical Examiners.

The Practical Examiners gained the impression that, in many of the Practical Examinations, there was a lack of application of physical principals to 'everyday' scanning; functions like compounding, were being used without the trainee sonographer really understanding what the concepts behind them are.

Often, candidates need to prepare mentally for their Practical Examinations; the best way to achieve this is to practise scanning under examination conditions, ideally with their supervisor and another sonographer which whom they are not familiar.

General OSCE and Oral Examination
There was a good pass rate for the Clinical Knowledge section of the OSCE.

In the Applied Physics section of the OSCE there appeared to be a distinct lack of application of physical principals to 'everyday' scanning. A good deal of work needs to be done in the area of applied physics. Generally, too many candidates had a poor knowledge of how ultrasound beams are formed and how electronic steering works. Candidates are advised to take full advantage of any physics lectures during the year.

Naomi Rasmussen
Ros Savage
Chris Sykes
General ASUM DMU Board of Examiners

Part 2 Obstetric

Obstetric Written Questions

Question 1: Legal and Ethics/Pelvic inflammatory disease
This was the compulsory question. Parts 1 to 4 related to acute pelvic inflammatory disease and were well answered by the majority of candidates, although knowledge of distinguishing ultrasound features for acute appendicitis, as a differential diagnosis, was somewhat lacking for the obstetric candidates.

Part 5 represented the ethics/ medico-legal question and the candidates generally handled it poorly. While the obstetric candidates demonstrated an understanding of

the basic ethical principles, they generally failed to accurately identify the main focus of the question (which was record keeping/medical records). Simply listing or discussing every ethics principles was inadequate for this question.

Question 2:
No candidates attempted the question on congenital uterine anomalies and gestational trophoblastic disease.

Question 3: Embryological process of twinning
Most candidates answered this question well, however, the candidates who did poorly failed to recognise the sonographic differences between monochorionic and dichorionic pregnancies.

Question 4: Amniotic fluid
This question on amniotic fluid abnormalities was well answered by most candidates. Candidates were familiar with both methods of measuring amniotic fluid and the abnormalities that can be associated with oligohydramnios and polyhydramnios.

Obstetric Practical Examination

The standard of the Obstetric Practical Examinations was very good with 80% of the presenting candidates successful.

The candidates presented well overall. Their setup, patient care, taking of clinical history and operation of machines was generally very good. Some candidates, however, did not take note of their equipment, optimal adjustments especially when adjusting overall gain (TGC) and focus markers and image depth. Candidates need to take care when optimising individual images with regards to depth and zoom.

Trainee sonographers need to appreciate that the fetus can move during the examination and they must be aware of the orientation of the fetus in relation to the transducer at all times.

All candidates need to be aware of the ASUM guidelines and protocols when performing their scans. All candidates are assessed according to ASUM standards; the candidate must demonstrate an ability to perform techniques included in the ASUM guidelines but which may not part of their departmental protocols eg. fetal M-mode in mid-trimester obstetrics and M-mode measurements in echocardiography.

With the increasing use of machines capable of compound imaging and harmonics, candidates need to know how best to optimise images on their machines with a working knowledge of the different options. They must be aware of how these technologies affect image interpretation and acquisition and the most appropriate uses of this information.

The scan results produced by a trainee sonographer should reflect what the clinician requested and extend the examination if necessary. Candidates should give some thought to the protocols they follow when scanning and must be able to discuss these with the Practical Examiners.

Often candidates need to prepare mentally for their Practical Examinations; the best way to achieve this is to practise scanning under examination conditions, ideally with their supervisor and another sonographer which whom they are not familiar.

Obstetric OSCE and Oral Examination

The Clinical Knowledge OSCE stations were well answered by most candidates, particularly for basic areas of knowledge such as polycystic ovaries and first trimester scans. Candidates need to remember to go back to basic principles and descriptions of ultrasound images, particularly if this is requested, so that even if they are unsure of the exact diagnosis, points may be awarded. Candidates need to become more familiar with normal neonatal head anatomy so as to be able to better identify abnormal anatomy. Candidates need to become more familiar with upper abdominal abnormalities such as gallbladder disease, which may commonly present in any womens' hospital.

The lack of understanding of physical principles in the Applied Physics OSCE stations seems to be a common problem throughout most specialties. Again, unsuccessful candidates failed the Applied Physics section. Candidates need to work on artifacts, transducers and colour Doppler.

Denise Ladwig
Ros Savage
Obstetric ASUM DMU Board of Examiners

Part 2 Vascular

Twelve candidates sat the DMU Vascular Part II Examination (or components of the Part II Examination).

Vascular Written Examination

Of the eight candidates who sat the written paper five passed. 63% of the Vascular candidates passed the Written paper, demonstrating a good understanding of renovascular hypertension and peripheral arterial disease in a vasculopath (Table 12 following page).

The written paper has four components and the results for each section are as follows:

Vascular Written Questions

Question 1: Legal and Ethics/ Chronic venous insufficiency
Most candidates answered the compulsory Ethical and Legal question comprehensively, while other candidates lost marks for being vague, superficial or irrelevant in their discussion. The remainder of question one related to chronic venous insufficiency where

Table 11 Obstetric – Part 2

Section	Topic	Candidates Pass/Presented	Pass Rate %	Mean Grade %
MCQ	Clinical Knowledge and Applied Physics	5/5	100	68
Q1 Compulsory	Legal and Ethics / Pelvic inflammatory disease	4/5	80	69
Q2	Congenital uterine anomalies and gestational	33/34	97	76
	trophoblastic disease	0/0	n/a	n/a
Q3	Embryological process of twinning	4/5	80	69
Q4	Amniotic fluid	4/5	80	78

discussion of symptoms, patient presentation, relevance of patient history and detailed duplex description were required. Some candidates displayed only limited understanding of the potential sources of recurrent varicose veins and complimentary diagnostic techniques for ovarian varicose veins.

Question 2: Renovascular Hypertension (RVH)
This question related to renovascular hypertension and the use of duplex ultrasound in its diagnosis. Candidates provided adequate information on all parts of this question.

Question 3: Peripheral Vascular Disease
In this question candidates were asked for a comparison of peripheral vascular disease processes in diabetic and non-diabetic patients. Most candidates answered all parts of this question satisfactorily.

Question 4: Thoracic Outlet Syndrome
Question 4 related to a scenario of a patient presenting with vague and variable upper extremity symptoms. This question required the candidate to list and explain all of the possible vascular causes for the patient's symptoms and describe, in the detail, the duplex examination they would undertake, providing the rational for their actions. Some candidates considered only one possible pathology and thus provided only a limited answer. The description of other non-imaging tests that could be performed in this scenario was poorly answered by some candidates.

As a general overview the Vascular Examiners would encourage candidates to read each question carefully and determine just what they are being asked. It should be noted that if the question asks for detailed description or a comparison of advantages and disadvantages, failure to provide the information requested in the question will be reflected in the mark awarded.

Vascular Practical Examination

The Practical Examinations were performed to a high standard in the majority of cases. Ten Vascular Practical Examinations were conducted throughout Australia and New Zealand in 2004. Two candidates resat their 2003 examinations and passed. Eight candidates underwent their Practical Examinations for the first time. Seven candidates successfully completed their Practical Examinations. This represents an overall 90% pass rate.

Often candidates need to prepare mentally for their Practical Examinations; the best way to achieve this is to practise scanning under examination conditions, ideally with their supervisor and another sonographer which whom they are not familiar.

Vascular OSCE and Oral Examination

Eleven candidates sat their OSCE and Oral Examination in Sydney on 16th October 2004. The OSCE is in two sections comprising Clinical and Applied Physics answers stations. The Oral Examination consists of Applied Physics and Clinical Related Situations.

All candidates passed the Applied Physics Oral (100%), while nine passed the Clinical Oral (82%). Seven candidates passed the Clinical section of the OSCE (64%). Candidates who sat the OSCE and Oral Examination performed well in the Applied Physics and Oral components of the examinations, and answered questions regarding lower extremity anatomy, peripheral arterial Doppler waveforms and peripheral venous Doppler flow to a satisfactory level. Candidates require a better understanding of non-imaging assessment of the vascular system, and the physiology of arterial and venous blood flow.

Rebecca Hetherington
Lucia Pemble
Vascular ASUM DMU Board of Examiners

Physical Principles of Ultrasound and Instrumentation

The Physical Principles of Ultrasound and Instrumentation (PHY) section of the DMU Part II assessment process usually results in higher overall pass rates than obtained in the clinical sections of the examination. This may be partly due to the realisation by most candidates that this is a part of the examination that they need to study, as they cannot rely on clinical experience.

Part of the reason for the high pass rate is also that the examination is not designed to assess the candidate's ability to perform as a physicist or an engineer but simply to judge whether the sonographers' understanding of the 'nuts and bolts' of their craft is sufficient to allow them to perform adequately in the clinical setting.

As the pass criteria in the OSCE simply requires the candidate to pass a majority of the OSCE stations, it is theoretically possible for a candidate to pass the Physics OSCE with an aggregate mark well below 50%.

In the past, this has not been a significant problem with even borderline pass candidates demonstrating a good understanding of many topics and a just-adequate understanding of others. In 2004, however, a disturbing trend was evident and was commented on by all the Physics Oral Examiners, in addition to the OSCE markers.

There appeared to be a much shallower understanding, overall, of the topics than in previous years. Many more candidates were awarded borderline passes in a significant number of Applied Physics stations.

It is clear that too many candidates this year lacked a detailed understanding of important topics and appeared to be relying on a superficial knowledge of 'facts' to scrape a pass.

Table 12 Vascular – Part 2

Section	Topic	Candidates Pass/Presented	Pass Rate %	Mean Grade %
MCQ	Clinical Knowledge and Applied Physics	8/8	100	62
Q1 Compulsory	Legal and Ethics / Chronic venous insufficiency	6/8	75	70
Q2	Diastolic function	5/5	100	73
Q3	Mitral regurgitation	5/5	100	58
Q4	Tetralogy of Fallot	5 /6	83	55

This problem will be addressed before the 2005 examinations. It is strongly recommended that candidates take full advantage of all educational opportunities provided by ASUM in preparing for these examinations.

Mike Dadd
Roger Gent
Chris Sykes
ASUM Physics DMU Board of Examiners

DMU EXAMINATIONS
James Hamilton tel +61 2 9958 7655 email dmu@asum.com.au will answer your questions about the DMU

DDU EXAMINATIONS
Marie Cawood tel +61 2 9958 7655 email ddu@asum.com.au will answer your questions about the DDU

Expression of Interest 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 2005.

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:

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

Please apply in writing with attachments (noted above) to:
Chairperson
ASUM DMU Board of Examiners
2/181 High St Willoughby
Sydney NSW 2068 Australia

DMU PRACTICAL EXAMINER TRAINING AND ACCREDITATION DAYS

ASUM Council has appointed the Australian Institute of Ultrasound to provide two courses per year for three years to train and accredit DMU Practical Examiners. These courses will be held in conjunction with the Multidisciplinary Workshops and the ASUM Scientific Meetings.

Numbers are strictly limited for each DMU Practical Examiner Training and Accreditation Day. Initially, the DMU Board of Examiners will offer places for the training program on the basis of immediate DMU Practical Examination requirements.

Examination dates and fees for 2005

DMU dates 2005

DMU Prep Course
Melbourne Wednesday 16th March – Sunday 20th March 2005

DMU Written Examinations
- Part I and II Written Examinations Saturday 30th July 2005
- Oral Examination and OSCE* (venues to be decided)
  - Cardiac Saturday 8th October 2005
  - General Saturday 15th October 2005
  - Obstetric Saturday 15th October 2005
  - Vascular Saturday 8th October 2005

*The DMU Board of Examiners determined the final locations for the OSCEs after final candidate numbers, venue availability and Examiner requirements were known. Candidates are again reminded that while the dates for OSCEs are fixed, all modalities are not necessarily examined at every centre.

DMU Practical Examinations
Practical Examinations are conducted at the candidate's clinical practice, where possible, by arrangement between the ASUM DMU Board of Examiners, the candidate and the practice managers, between April and November.

DMU Practical Examiner accreditation and training days
- Melbourne Thursday 17th March (Multidisciplinary Workshop)
- Wellington Friday 29th July (NZ Branch Meeting)
- Adelaide Thursday 29th September (Annual Scientific Meeting)

Part I DMU fees 2005

Anatomy, Physiology and Pathology (APP) Only
(Having previously been granted an exemption to PHY)
- $A600.00 + GST* = $A660.00 (Australia)
- $A600.00 (New Zealand and elsewhere)

Physical Principles of Ultrasound and Instrumentation (PHY) Only
- (Having previously been granted an Exemption to APP)
- $A600.00 + GST* = $A660.00 (Australia)
- $A600.00 (New Zealand and elsewhere)

APP and PHY
- $A900.00 + GST* = $A990.00 (Australia)
- $A900.00 (New Zealand & elsewhere)

*GST applies to Australian Residents only

Part II – DMU fees 2005

ASUM MEMBER

Written, Practical and OSCE
- $A1600.00 + GST* = $AU1760.00 (Australia)
- $A1600.00 (New Zealand and elsewhere)

Written ONLY
- $A900.00 + GST* = $AU990.00 (Australia)
- $A900.00 (New Zealand and elsewhere)

Written and Practical
- $A1500.00 + GST* = $AU1650.00 (Australia)
- $A1500.00 (New Zealand and elsewhere)

Written and OSCE
- $A1100.00 + GST* = $AU1210.00 (Australia)
- $A1100.00 (New Zealand and elsewhere)

Practical and OSCE
- $A1300.00 + GST* = $AU1430.00 (Australia)
- $A1300.00 (New Zealand and elsewhere)

Practical ONLY
- $A1100.00 + GST* = $AU1210.00 (Australia)
- $A1100.00 (New Zealand and elsewhere)

OSCE ONLY
- $A700.00 + GST* = $AU770.00 (Australia)
- $A700.00 (New Zealand and elsewhere)

*GST applies to Australian Residents only

Miscellaneous DMU fees

Exemption and waiver application fees – Part I and Part II
- $A150.00 +GST = $A165.00 (Australia) non refundable
- $A150.00 (New Zealand and elsewhere) non refundable

Deferral application fees – Part I and II
- $A150.00+GST = $A165.00 (Australia) non refundable
- $A150.00 (New Zealand and elsewhere) non refundable

Request for essay remark – Part II
- $A50.00 + GST* = $A55.00 (Australia) per question
- $A50.00 (New Zealand and elsewhere) per question

Application for appeal – Part II
- $A150.00 + GST* = $A165.00 (Australia) non refundable
- $A150.00 (New Zealand and elsewhere) non refundable

*GST applies to Australian Residents only

DMU EXAMINATIONS James Hamilton tel +61 2 9958 7655 email dmu@asum.com.au will answer your questions about the DMU

DDU dates and fees 2005

Examination Fee Part I

ASUM Member

- $A900.00 + GST* = $A990.00 (Australia)
- $A900.00 (New Zealand and elsewhere)

Non-Member

- $A1140.00 + GST* = $A1254.00 (Australia)
- $A1140.00 (New Zealand and elsewhere)

Examination Fee Part II

ASUM Member

- $A1600.00 + GST* = $A1760.00 (Australia)
- $A1600.00 (New Zealand and elsewhere)

Non-Member

- $A1840 + GST* = $A2024.00 (Australia)
- $A1840.00 (New Zealand and elsewhere)

Part II Casebook Fee

- $A300 + GST* = $A330.00 (Australia)
- $A300.00 (New Zealand and elsewhere)

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

Information pertaining to the next examinations

2005 Part I

The Part I Examinations for 2005 will be held on Monday 16th May 2005 with applications closing on Monday 21st March 2005.

2005 Part II

Casebooks for 2005 Part II DDU Examination must be submitted by Monday 17th January 2005 and accompanied by the prescribed fee of $A330.00 for all participants.

The Written Examination for Part II will be held on Monday 16th May 2005 with the closing date being Monday 21st March 2005.

The Oral Examination for Part II will be held on Saturday 18th June 2005 in Sydney. The Oral Exam for Cardiology candidates will be in Melbourne on Thursday 16th June 2005.

Results

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

The ASUM *Ultrasound 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 *Ultrasound Bulletin*.

***GST applies to Australian Residents only**

DDU EXAMINATIONS
Marie Cawood
tel +61 2 9958 7655 email ddu@asum.com.au
will answer your questions about the DDU

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) and have completed their most recent ultrasound qualification within the last 10 years.

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 24 June 2005 to:
GE Beresford Buttery Overseas Traineeship
c/- ASUM 2/181 High Street Willoughby
NSW 2068 Australia

2004 DMU Diplomas and Part 1 Passes

DMU Diplomates

Cardiac
6th May 2004
Cameron Collard
Rebecca Thomson

20th November 2004
Sarah Bainbridge
Glen Barker
Rebecca Barnes
Rebekah Jayne Berger
Benjamin Craig Bolton
Catherine Ann Brazzale
Kristen Bricknell
Kathryn Brown
Joanne Burkett
Jocasta Brodie Daley
Suzanne Elisabeth Davy-Snow
Judith Donovan
Robert Fowler
Xiangyong Gu
Nathan Hawke
Graham Jenkins
Rhonda Kent
Nerida Ann Minett
Justin O'Leary
Shawn P. O'Leary
Melissa Sale
Rachel Lee Schreiber-Wood
Lee Danielle Taylor
David Treloar
Marie-Louise Visser
Lauren Wilson
David John Yeoman

General
6th May 2004
Holly Elizabeth Jean Kilmurray
Margot Quinn
Phillipa Jane Snow

20th November 2004
Wendy Kay Barrett
Julie Bartholomew
Scott Kenneth Berger
Lucy Berwick
Joanne Bolton
In-Suk Cho
Sally Jane Dunbar
Kate Louisa Easton
Jennifer Maree Gerlach
Micaela Cornelia Gumbley
Levona Audrey Hay
Debbie Hodder
Jarkov Alexei
Sheree Lloyd
Gail Kathleen Michels
Justin Hayden Molloy
Christine Phillips
Carly Therese Porter
Peter Gerard Price
Tyrone Riley
Gareth Robb
Rebecca Jane Rutherford
Sumi Shrestha
Shobha Singh
Pamela Smith
Pia Tunbridge
Wendy Joanne Waghorn

Obstetric
20th November 2004
Joanne Cleary
Alison Egar
Lisa Anne Miller
Toni Shurmer

Vascular
20th November 2004
Anita Joy Humphries
Penny SP Koh
Catherine Sue Kovatch
Mai Anh Snelgrove
Adam Tolfree
Anil Verma

2004 DMU Part I Pass Candidates

Cardiac
Aaron Ailwood
Sean Allwood
Richard Allwood
Erin Baumgartel
Susan Berman
Colin Burke
Jenny Centofanti
Christopher Chan
Thomas Curnow
Melita Decker
Haritha Gadde
Andrew Hall
James Harley
Glenn Hastings
Samantha Hickman
Mark Higgins
Matthew Ischenko
Vikki Milmine
Yukari Newman
Marilyn Noye
Nicholas Palmieri
Marnie Peacock
David Scicluna
Marcus Silbery
Rachel Stevenson
Paul Stoodley
Craig Thomson
Daniel Traves
Andrew Yeadon

General
Mayasa Athmani
Fadwa Ayoubi
Arong Saemi Bae
Relda Beere
Jane Bucholz
Angela Cheng
Vivaganagie Chetty
Stacey Day
Jillian Earle
Warren Forgus
Carolyn Fredericks
Priscilla Gaffur
Jennifer Gillespie
Samantha Hunt
Mohammed Hussain
Grazyna Imielska
Mana Jamali
Lara James
Pavlo Korol
Nilesh Kumar
Emma Larkin
Xuesen Liu
Amy McGill
Katherine McGlynn
Stuart McGregor
Graham McRae
Joanne Mewes
Sarah Morgan
Chau Nguyen
Gabrielle O'Grady
Dipti Patel
Louisa Platt
Sheri Rae
Shameen Ramlall
Carolyn Raynor
Michael Rock
Sarah Shortus
Natalie Smith
Barbara Symes
Jeneen Tattersall
Antoinette Van Rensburg
Lucienne Velvin
Melanie Wagner
Claire Walker

Obstetric
Linda Worn Ham

Vascular
Christine Bolton
Michael Cartmill
Aleksandr Feldman
Susan Gibb
Linda Petersen
David Robinson,
Louise Tarr
Alan Williams

Corporate Members 2004

Agfa-Gevaert Ltd
Scopix, Matrix Images, Digital Memories
David Chambers
tel +61 3 9264 7711
email david.chambers1@agfa.com

Australian Imaging Ultrasound Distributors Pty Ltd
Sharmaine Crooks
tel +61 2 9888 1000
email sharmaine@AUDIST.com.au

Australian Medical Couches
Couch Manufacturer
Marcus Egli
tel +61 3 9589 3242
email megli@bigpond.net.au

Bambach Saddle Seat Pty Ltd
Sue Johnston
tel +61 2 9939 8325
email sjohnston@bambach.com.au

Bristol-Myers Squibb Medical Imaging
Ultrasound Contrast and Nuclear Imaging Agents
Wayne Melville
tel +61 2 9701 9108 mob 0409 985 011
email wayne.melville@bms.com

Central Data Networks Pty Ltd
CDN. Affordable PACS and Medical Imaging Networks
Robert Zanier
tel +61 1300 722 632 mob 0407 069 307
email info@cdn.com.au

Elsevier Australia
Health Science Publisher
Effie Papas
tel +61 2 9517 8953
email e.papas@elsevier.com

GE Healthcare
Tsui Lian
tel +61 2 9846 4850
email tsui_min.lian@med.ge.com

InSight
Aloka/SonoSite
John Walstab
tel +61 1800 228 118
email jwalstab@insight.com.au

Mayne Health
Comprehensive Health
Darryl Lambert
tel 0412 547 021
email darryl.lambert@maynegroup.com

Medfin Aust Pty Ltd
Leasing Finance for Medical Practitioners
Michael Fazzorlari
tel +61 2 9462 2204
email michael_fazzorlari@medfin.com.au

Meditron Pty Ltd
Acoustic Imaging, Dornier, Kontron
Michael Fehrman
tel +61 3 9879 6200
michaelf@dornier.meditron.com.au

Peninsular Vascular Diagnostics
Vascular Ultrasound Education
Claire Johnston
tel +61 3 9781 5001
email pvdvic@austarmetro.com.au

Philips Medical Systems Australasia Pty Ltd
Liz Jani
tel +61 2 9947 0165
email liz.jani@philips.com

Queensland X-Ray
Radiology
Lynne Salmon +61 7 3343 9466
email lsalmon@qldxray.com.au

Rentworks Ltd
Medical Leasing Equipment
Don Hardman
tel +61 2 9937 1074
email don.hardman@rentworks.com

Schering Pty Ltd
Ethical Pharmaceuticals
John Peace
tel +61 2 9317 8666
email jpeace@schering.com.au

Siemens Limited – Medical Solutions
Nick Kapsimallis
tel +61 2 9491 5863
email nick.kapsimallis@siemens.com

Sonosite Australasia Pty Ltd
Hand-carried ultrasound
Greg Brand +61 2 9453 2855
email greg.brand@sonosite.com

Toshiba (Aust) Pty Ltd Medical Division
David Rigby
tel +61 2 9887 8063
email drigby@toshiba-tap.com

Philips introduces the first echocardiography system to generate 3D measurements of the heart in less than one minute

Philips Medical Systems Australasia has announced the Australian launch of a new generation of cardiac ultrasound equipment using high definition imaging to help diagnose heart disease and on-cart data analysis tools that help to make treatment decisions, and monitor their success.

The company says that the new iE33 intelligent echocardiography system features extraordinary levels of 2D image quality, powerful 2D and 3D measurement of cardiac function and anatomy, live 3D imaging of a beating heart and user-centred ergonomics. The system also offers a wide range of high-performance features including voice-activated control and automated image optimisation technologies.

According to Wayne Spittle, Managing Director, the new iE33 system has much improved image quality for both 2D and live 3D imaging.

"The Philips iE33's new line of transducers includes the S5-1 with PureWave crystal technology, the biggest breakthrough in transducer material in 40 years."

The iE33 is the first premium echocardiography system to feature fully-integrated 2D and 3D cardiac quantification software for measurements such as left ventricle (LV) volume and ejection fraction, both key indicators of heart health. Data acquired from these types of examinations will potentially determine treatment options and monitor the patient's progress.

"Now that there are so many congestive heart failure and valve disease patients, the ability to quantify is becoming more and more important," said Roberto M Lang, MD, Director of Noninvasive Cardiac Imaging Labs, University of Chicago Hospitals. "Having quantification on the iE33 system gives us the cutting edge tools we need to link the numbers and outcomes."

Liz Jani, Business Manager, Ultrasound at Philips Medical Systems said: "Thanks to the new iE33, doctors can analyse global LV volume curves and regional waveforms to identify and measure LV regional timing."

The iE33 system has been designed to address these challenges with a unique ergonomic design that adjusts to the user. It also has hands-free voice command, one-button automated optimisation controls for quick and consistent image acquisition between users of varying skill levels, and a simpler, easy-to-use interface.

ASUM Asia Link Meeting – Excellence in Ultrasound: Kuala Lumpur, Malaysia

ASUM held its second ASUM Asia Link Meeting – Excellence in Ultrasound on 5–6th November 2004 at the Sheraton Imperial Hotel Kuala Lumpur.

The meeting attracted about 65 people, including delegates, speakers, partners and sponsors. The program was enjoyed by all who attended the presentations, which were given by interesting speakers from Malaysia, Australia and New Zealand.

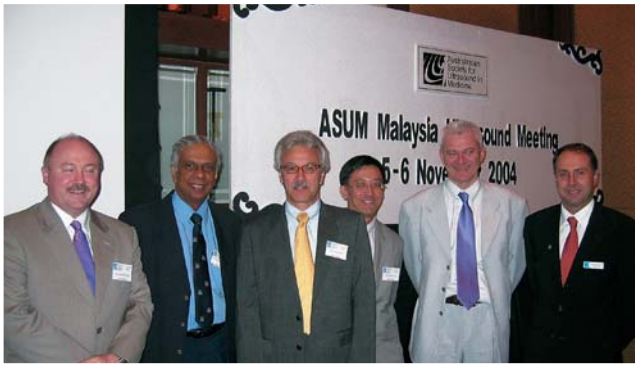
Many of the overseas delegates commented highly on the quality of the meeting, the venue and the people. Most felt that attending this meeting represented good value for money. Exposure to the different cultures in Malaysia and the opportunity to meet with professional colleagues in Asia was appreciated.

ASUM acknowledges the support of Medison, Malaysian Airlines and Malaysian Tourism.

The next ASUM Asia Link Meeting – Excellence in Ultrasound will be held in Bangkok on 10–11th November 2005. Enquiries should to be directed to carolinehong@asum.com.au

Malaysian cultural dinner show

Delegates taking a break



L–R Dr Glenn McNally, Dr Raman Subramaniam, Dr Stan Barnett, Dr Patrick Chia, Dr Simon Meagher and Dr David Rogers

L–R Dr Raman Subramaniam, Dr TP Baskaran, Dr Sulaiman Tanamang, Mr Roger Gent, Dr Andrew Ngu and Dr David Rogers

Delegates from Australia and Malaysia listening intently

Dr Teresa Chow, a Malaysian O&G speaker with ASUM CEO Dr Caroline Hong

Chris Kohlenberg Teaching Fellowship 2004: 2800 km, 7 cities and 8 days in the South Island

Peter Murphy

Staff at Invercargill Hospital

It was an honour to accept the Chris Kohlenberg Teaching Fellowship award for 2004. This involved visiting many ultrasound departments on the South Island of New Zealand.

I arrived in Christchurch, at 1 am on Sunday 31st October, to begin a journey that took me to Nelson, Greymouth, Franz Josef, Queenstown, Invercargill, Dunedin and then finally back to Christchurch.

After 2800 km, seven nights and eight days, I finished up totally exhausted and richer in knowledge and friendships from my whirlwind visit.

Nelson Hospital was my first contact with local sonographers. Many hours were spent scanning musculoskeletal patients and discussing ergonomics. The large ultrasound rooms available ensure greater staff comfort in scanning with more flexibility in equipment location.

Thank you for your hospitality. The new scanning technique in visualising the biceps brachialis tendon insertion works quite well.

Monday evening and Tuesday was spent driving the west coast through the most spectacular mountain ranges, climbing Franz Josef glacier, then travelling on to Queenstown for a much needed rest (jet boating and riding the luge).

Wednesday evening and Thursday were spent at the new Invercargill Hospital. The evening began with a short discussion on ergonomics and scanning techniques. This hospital has a modern, spacious ultrasound department, with enthusiastic sonographers willing to take on any challenges that come their way.

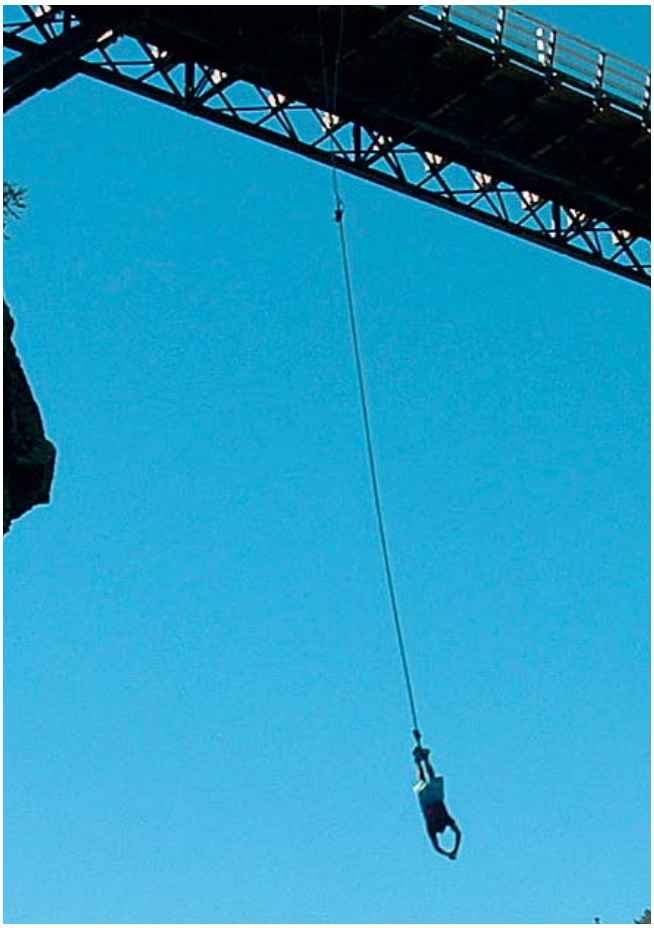
On Friday I went to Dunedin Hospital and Otago Radiology. The main focus of this day was musculoskeletal imaging. The sonographers were extremely enthusiastic and critiqued my scanning techniques every step of the way.

The challenge on this trip was to share my 17 years of musculoskeletal, vascular, general and obstetric scanning in eight days. I hope I was able to impart this knowledge to my peers so they could benefit from my experiences and mistakes over the years.

No sonographer should experience pain while scanning. We must all sit back and look at our own scanning technique. Talk to others and be flexible in our work environment. Move the patient, machine and ourselves to minimise scanning pain. Watch how people grip transducers. Learn and listen to the sonographers who have scanned for years without discomfort or who have learned their lesson the hard way and have been rehabilitated.

Sonographers at Dunedin

Seminars in all South Island cities were well attended



Bungeeeee

A big thank you must go out to Jill Muirhead for coordinating this trip, the wonderful BBQ and the fireworks.

The seminar on Saturday was well attended, by about 30 people. The casual atmosphere and open questioning enabled better interaction and learning. I was very privileged to be presenting this seminar alongside Martin Necas (from the North Island). His enthusiasm, knowledge and skills made it a hard act to follow.

A big thank you must go to GE Healthcare and ASUM for their support of this award. The memory of Chris Kohlenberg and his enthusiasm for teaching means a lot to me. I had the privilege of lecturing alongside Chris on two occasions and shared his ideals and passion for education. We must maintain this momentum for future generations to learn. Chris made me realise that it is not just the technology we must learn about, but our interaction with the people we scan, listening and displaying empathy when needed.

I highly recommend to all who travel to this spectacular country to be brave and try bungy jumping; I loved it, can't wait to do it again.

South Island members say 'thank you, Peter'

In November, we were lucky to have Peter Murphy travel through parts of the South Island of New Zealand, visiting the smaller areas as the recipient of the Chris Kohlenberg Teaching Fellowship sponsored by GE Healthcare.

Peter arrived in Christchurch at 1 am on 31st October, with his wife Helen and two boys Andrew and Christopher.

It was my privilege to be involved in organising of his visit. I know I worked Peter very hard, with a huge amount of travel during his week here. He was very happy to share his skills and knowledge in general, musculoskeletal, vascular and obstetric ultrasound.

Feedback from sonographers and radiologists in Nelson, Invercargill and Dunedin was that it was an extremely worthwhile exercise. There was huge appreciation for having someone like Peter visit us.

The trip concluded with a seminar in Dunedin, where Martin Necas joined Peter as a guest presenter. The combination of the two was excellent and we had a very successful day with about 30 registrants attending.

One week after arriving in New Zealand, Peter and his family left Dunedin for a day of R & R in Christchurch before heading home, after travelling close to 3000 km.

Thank you Peter for your efforts.

We are very grateful to GE Healthcare for sponsoring the Chris Kohlenberg Travelling Fellowship to enable a recognised expert to visit us at home.

Thanks also to Kodak NZ for their sponsorship contribution towards the Dunedin seminar.

Jill Muirhead
Otago Radiology

New members October 2004 – January 2005

October 2004

Full members
Anita Crozier SA
Ivy Le Vic
Kylie Place Qld

Associate members
Christopher Lewis Vic
Kay Race NSW

Trainee members
Gerhardus Swartz NZ

November 2004

Full members
Michelle Horn WA
Michael Nicholl NSW
Renuka Sekar NZ
Bridget Sutton Qld
Susanne Verwey NZ

Associate members
Karen Bell NSW
Sally Biersteker NSW

Trainee members
Lisa Hui NSW

December 2004

Associate members
Melitta Allanson NSW
Monique Azzopardi Qld
Maria Korsakova NSW
John Nolan WA
Katrina O'Neill WA
Michelle Tsai ACT

Trainee members
Antonia Shand NSW
Joseph Thomas SA

January 2005

Full members
Kaylene Burgess SA
Susan Farnan SA
Anne Maree Grant Qld
Brigid Hill NZ
Susan Howland Qld
Angeline Leet Vic
Sean McPeake SA
Sharon Meng Qld
Karen Mizia NSW
Lynette Muir SA
Lino Piotto SA
Kenneth Roper NSW
Theresa Rowan SA
Gregory Sweetman WA

Associate members
Muhammad Anwar NSW
Charlene Cheng NSW
Amanda Dunne NSW
Michael Gorman WA
Emma Johnstone Qld
Tanya Pilgrim Qld
Sonia Rose NSW
Donna Twining NSW
John Wai NSW
Kimara Wallace Vic

Trainee members
Pallav Garg Vic
Alexander Klistorner NSW
Francis Ponnuthurai Vic
Emma Parry NZ

Book and CD reviews

Ultrasound Diagnosis of Fetal Anomalies

Authors/Editors M Entezami, M Albig et al.
Publisher Thieme 2004
Approx Cost $A302.50
ISBN 3 13 1318 619

This 371-page text book describes the ultrasound diagnosis of fetal abnormalities. It is very well written and presented and contains 488 beautiful, colourful and appropriate illustrations.

The co-authors have had a wealth of experience in the subject matter.

The book is divided into five sections and 18 chapters. The layout makes it easy to read and, with the illustrations, it is an ideal textbook for reference by any unit involved in the diagnosis of fetal abnormality.

The first chapter details what to look for during routine ultrasound screening in the first second and third trimesters of pregnancy. The second section 'Systematic scanning of fetal abnormalities' describes the anomalies seen in different parts of the fetus, these are accompanied by beautiful illustrations. Other chapters include anomalies of the central nervous system, face and neck, thorax, the heart, abdomen, urinary tract and skeletal anomalies.

There are two chapters in the section 'Chromosomal disorders and their soft markers'. The first is entitled 'Chromosomal disorders' and describes the features of common trisomies. The second chapter, titled 'Soft markers of chromosome', describes the various soft markers and their clinical relevance.

The third section of the book titled 'Selected syndromes and association' gives detailed abnormal findings in 45 clinical syndromes. The syndromes described are well illustrated with postmortem pictures to match the ultrasound findings.

The last section of the book, titled, 'Other causes of fetal diseases anomalies' consists of seven chapters. These describe various clinical conditions which could affect fetal outcome, including fetal hydrops, intrauterine infection, diseases of placenta, cord and amniotic fluid, multiple pregnancy, growth disturbance, diabetes and drugs.

The textbook is very well written and illustrated and is an invaluable reference for clinicians involved in prenatal diagnosis, counselling and management of fetal abnormalities. It assists in the attempt to group abnormalities into syndromes.

Dr Andrew Ngu
The Royal Melbourne Hospital

Teaching Manual of Color Duplex Sonography. A workbook on Color Duplex Ultrasound and Echocardiography. 2nd Edition

Editor Matthias Hofer
Publisher Thieme 2004
Cost $A91.30
ISBN ISBN 1 800 263 951

This 108-page book contains nine chapters covering:

Basic physical and technical principles
Cerebrovascular imaging
Cervical lymph nodes and thyroid
Abdomen
Nephrology and Urology
Obstetrics and gynaecology
Peripheral arteries
Peripheral veins
Echocardiography

The most impressive feature of this book is the quality of the images. These include B-mode images, PW Doppler spectral traces, colour and amplitude images, anatomical drawings as well as photographs depicting transducer placement and movement on the patient's skin.

The normal anatomy, anatomical variants and pathological findings are all discussed, and every chapter contains numerous images to support the text, clearly conveying the clinical link to the content. Highlighted boxes contain important information such as diagnostic criteria for a particular study, the controls used to optimise the PW Doppler spectral trace and examination findings and pitfalls.

A removable card is included with the book for easy reference to diagnostic criteria (although the carotid duplex criteria are not included on the card).

At the end of each chapter there are review questions (with the answers in the back of the book). These would be extremely valuable to any student of ultrasound as they encompass a diverse range of duplex examinations and interventional techniques.

The overview of the physics of Doppler is brief. There are only superficial descriptions of haemodynamics, echo contrast agents, harmonic imaging and extended field of view imaging. This information provides a refresher and would not be comprehensive enough for the student studying towards their vascular DMU.

There are several minor typographical errors and translational errors (from German to English) throughout the book. Given the book's size it contains a remarkable amount of information, but further review of the literature would be required if comprehensive detail or alternate diagnostic criteria were required.

Dr Lucia Pemble
Senior Lecturer
School of Biomolecular and Biomedical Science
Griffith University

Peripheral Musculoskeletal Ultrasound. A CD ROM Atlas

Authors JE Cabay and B Daenen
Editor RF Dondelinger
Publisher Thieme Interactive

This CD is an updated version of the text, also edited by RF Dondelinger, entitled 'Peripheral Musculoskeletal Ultrasound Atlas', published in 1996. The CD requires at least a 486 processor, 8 mb RAM and Windows 95 or above for PCs and at least a 68030 processor, 8mb RAM and a 7.0 system or higher for Macintosh computers.

It is divided into five main sections: technique, general and regional anatomy, and general and regional pathology.

In the technique section, videos showing the examination being performed on a model have replaced images for the examination of the shoulder, ankle, knee and elbow. Synchronous video or still images of the body part examined are not shown. The technique section also covers artifacts.

Anatomical and subsequently

pathological descriptions with images are given for muscle, ligament, tendon, bursa, bone and periosteum, joint capsule and bursa, hyaline cartilage, fibrocartilage, vessels, nerves and skin and then for the ankle, elbow, foot, hand wrist, shoulder, hip and knee in the regional sections. Much MSK pathology is covered with limited coverage of tumours.

Some of the terminology employed doesn't see common usage in Australia or New Zealand, for example 'desinsertion'. The term tendonitis is also used, this has largely been replaced locally by tendinopathy or tendinosis.

Images are of high quality, all taken using 5MHz, 7.5 MHz or 10 MHz transducers, depending on the region, but there are not as many as in the text (380 images on the CD compared to 750 in the text).

A search engine is available as an index, although this is incomplete. For example Gamekeeper's thumb and Stener's lesion are in the text, but I could only find them by looking under 'ulnar collateral'.

The quiz began with anatomy. It was only possible to access the quiz sequentially whereas it might have been helpful also to be able to access it by topic. A quiz about anatomy from still images is rather artificial and not at all like looking for a particular anatomical structure in a patient.

The CD was easy to navigate after a few minutes of orientation. The image box only takes up a small portion of the display screen.

Overall this is a useful CD for those learning musculoskeletal ultrasound or for non-specialists. A fuller text would be needed for problem solving, for reference and for anatomy.

Dr Patsy Robertson
Consultant Radiologist
The Royal Melbourne Hospital

ASUM Giulia Franco Teaching Fellowships 2005 Sponsored by Toshiba Ultrasound

The Giulia Franco Teaching Fellowship was established by ASUM in association with Toshiba Medical to provide educational opportunities for sonographers in all parts of Australia and New Zealand.

The fellowships increase the opportunity for members outside the main centres to have access to quality educational opportunities.

It is named to commemorate Giulia Franco whose passion for ultrasound education took her to all parts of Australia and New Zealand, and continued as she moved into a business career with Toshiba. Its first award, in 2004, provided educational programs in Western Australia.

Further details are on the ASUM website at www.asum.com.au

Branches wishing to propose programs for the 2005 Teaching Fellowships should contact:

Keith Henderson
tel +61 2 9958 6200 fax +61 2 9958 8002
email khenderson@asum.com.au

Send nominations and proposals to:
The Education Manager
ASUM 2/181 High St
Willoughby 2068 NSW Australia

TOSHIBA

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

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, providing educational programs in provide educational opportunities for members in New Zealand, Queensland, New South Wales, Northern Territory, Western Australia, Victoria, South Australia and Tasmania.

It is named to commemorate Dr Chris Kohlenberg, who died while travelling to educate sonographers.

Further details are on the ASUM website www.asum.com.au 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

Send nominations and proposals to:
The Education Manager
ASUM 2/181 High St
Willoughby 2068 NSW Australia

GE Medical Systems
Ultrasound

Wed 11 Feb – 2 Days American Institute of Ultrasound in Medicine (AIUM) presents: Ob/Gyn Ultrasound: How to Optimize Your Skills and Prepare for the Future
Venue: Four Seasons Hotel Las Vegas, Las Vegas, Nevada, USA
Contact: Danielle Delanko on +1 301 498 4100 or +1 800 638 5352 or register online at www.aium.org

Tue 1 Mar 2005 DMU Part I and II 2005 Exemption Applications close
Contact: James Hamilton, DMU Coordinator, Ph: +61 2 9958 0317; Fax: +61 2 9958 8002, Email: dmu@asum.com.au

Wed 16 Mar 2005 – 5 Days DMU Prep Course
Contact: James Hamilton, DMU Coordinator, Ph: +61 2 9958 0317; Fax: +61 2 9958 8002, Email: dmu@asum.com.au

Wed 16 Mar 2005 – 2 Days DDU Technical Seminar
Contact: DDU Coordinator, Ph: +61 2 9958 7655; Fax: +61 2 9958 8002, Email: ddu@asum.com.au

Thu 17 Mar 2005 Nuchal Translucency Course
Contact: ASUM, 2/181 High Street, Willoughby, NSW, 2068.
Ph: +61 2 9958 7655; Fax: +61 2 9958 8002; Email: education@asum.com.au

Fri 18 Mar 2005 – 2 Days ASUM Multidisciplinary Workshop involving interactive programs in Obstetric, Gynaecological, Musculoskeletal, Vascular, Cardiac, Small Parts and Breast Ultrasound
Contact: ASUM, 2/181 High Street, Willoughby, NSW, 2068.
Ph: +61 2 9958 7655; Fax: +61 2 9958 8002; Email: education@asum.com.au

Fri 18 Mar 2005 – 3 Days ASUM Obstetric & Gynaecological Ultrasound Symposium held in conjunction with the ASUM Multidisciplinary Workshop
Contact: ASUM, 2/181 High Street, Willoughby, NSW, 2068.
Ph: +61 2 9958 7655; Fax: +61 2 9958 8002; Email: education@asum.com.au

Fri 18 Mar 2005 – 2 Days ASUM Vascular Symposium held in conjunction with the ASUM Multidisciplinary Workshop
Contact: ASUM, 2/181 High Street, Willoughby, NSW, 2068.
Ph: +61 2 9958 7655; Fax: +61 2 9958 8002; Email: education@asum.com.au

Mon 21 Mar 2005 DDU Part I 2005 Applications close
Refer DDU Handbook for further information.
Contact: Marie Cawood, DDU Coordinator, Email: ddu@asum.com.au

Mon 21 Mar 2005 DDU Part II 2005 Applications close
Refer DDU Handbook for further information
Contact: Marie Cawood, DDU Coordinator, Email: ddu@asum.com.au

Thu 31 Mar 2005 DMU Part I and II 2005 Examination Applications close
Contact: James Hamilton, DMU Coordinator, Ph: +61 2 9958 0317; Fax: +61 2 9958 8002; Email: dmu@asum.com.au

April Onwards DMU Part II Supplementary Practical Examinations
Contact: James Hamilton, DMU Coordinator, Ph: +61 2 9958 0317; Fax: +61 2 9958 8002, Email: dmu@asum.com.au

Mon 16 May 2005 DDU Part I 2005 Exams Refer DDU Handbook for further information
Contact: Marie Cawood, DDU Coordinator, Email: ddu@asum.com.au

Mon 16 May 2005 DDU Part II 2005 Written Exams
Refer DDU Handbook for further information
Contact: Marie Cawood, DDU Coordinator, Email: ddu@asum.com.au

Thu 16 Jun 2005 DDU Part II 2005 Oral Exams for cardiology candidates held in Sydney only
Refer DDU Handbook for further information
Contact: Marie Cawood, DDU Coordinator, Email: ddu@asum.com.au

Sat 18 Jun 2005 DDU Part II 2005 Oral Exams for non-cardiology candidates held in Sydney only
Refer DDU Handbook for further information
Contact: Marie Cawood, DDU Coordinator, Email: ddu@asum.com.au

Sun 19 Jun 2005 – 3 Days 2005 AIUM Annual Convention
Venue: Walt Disney World Swan and Dolphin, Orlando, FL USA
Contact: Brenda Kinney, AIUM, Ph: +1 301 498 4100; Email: bkinney@aium.org; Website: www.aium.org

Fri 29 Jul 2005 – 3 Days ASUM NZ Joint Meeting with RANZCR
Location: Wellington NZ

Sat 30 Jul 2005 DMU Part I and Part II Written Examinations
Contact: James Hamilton, DMU Coordinator, Ph: +61 2 9958 0317; Fax: +61 2 9958 8002, Email: dmu@asum.com.au

Aug – Oct DMU Part II Practical Examinations
Contact: James Hamilton, DMU Coordinator, Ph: +61 2 9958 0317; Fax: +61 2 9958 8002, Email: dmu@asum.com.au

Thu 29 Sep 2005 – 4 Days ASUM 2005. 35th Annual Scientific Meeting of the Australasian Society for Ultrasound in Medicine.
Venue: Adelaide Convention Centre, Adelaide.
Contact: ASUM, 2/181 High Street, Willoughby, NSW, 2068. Ph: +61 2 9958 7655; Fax: +61 2 9958 8002; Email: asum@asum.com.au

Sat 8 Oct 2005 DMU OSCE Cardiac and Vascular Examinations
Contact: James Hamilton, DMU Coordinator, Ph; +61 2 9958 0317; Fax: +61 2 9958 8002, Email: dmu@asum.com.au

Sat 15 Oct 2005 DMU OSCE General and Obstetrics Examinations
Contact: James Hamilton, DMU Coordinator, Ph: +61 2 9958 0317; Fax: +61 2 9958 8002, Email: dmu@asum.com.au

Wed 5 Nov 2005 DMU Supplementary Part 1 Written Examination
Contact: James Hamilton, DMU Coordinator, Ph: +61 2 9958 0317; Fax: +61 2 9958 8002, Email: dmu@asum.com.au

Thu 10 Nov 2005 - 2 Days ASUM Thailand Location: Bangkok
Contact: ASUM, 2/181 High Street, Willoughby, NSW, 2068. Ph: +61 2 9958 7655;
Fax: +61 2 9958 8002; Email: asum@asum.com.au

2006

18 May 2006 – 3 Days X World Congress of Echocardiography and Vascular Ultrasound
Venue: Marrakesh, Morocco
Contact: Navin C. Nanda, MD, President ISCU, PO Box 323, Gardendale, AL 35071, USA.
Ph: +1 205 934 8256; Fax: +1 205 934 6747; Email: isuc@iscu.org

28 May 2006 – 5 Days 11th Triennial Congress World Federation for Ultrasound in Medicine and Biology
Venue: Seoul, Korea.
Contact: Byung Ihn CHOI, M.D., Congress Secretariat, Ph: +82 2 760 2515; Fax: +82 2 743 6385; Email: choibi@radcom.snu.ac.kr; Web: http://www.wfumb2006.com

Sat 29 Jul 2006 DMU Part I and Part II Written Examinations – Provisional
Contact: James Hamilton, DMU Coordinator, Ph: +61 2 9958 0317; Fax: +61 2 9958 8002; Email: dmu@asum.com.au

Thu 14 Sep 2006 – 4 Days ASUM 2006. 36th Annual Scientific Meeting of the Australasian Society for Ultrasound in Medicine
Venue: Melbourne.
Contact: ASUM, 2/181 High Street, Willoughby, NSW, 2068.
Ph; +61 2 9958 7655; Fax: +61 2 9958 8002; Email: asum@asum.com.au

2007

Sat 28 Jul 2007 DMU Part I and Part II Written Examinations – Provisional
Contact: James Hamilton, DMU Coordinator, Ph; +61 2 9958 0317; Fax: +61 2 9958 8002; Email: dmu@asum.com.au

2008

Sat 26 Jul 2008 DMU Part I and Part II Written Examinations – Provisional
Contact: James Hamilton, DMU Coordinator, Ph; +61 2 9958 0317; Fax: +61 2 9958 8002; Email: dmu@asum.com.au

2009

Thu 5th Sep 2009 – 4 Days ASUM hosts: WFUMB 2009 World Congress in Sydney, Australia.
Venue: Sydney Convention and Exhibition Centre.
Contact: ASUM, 2/181 High Street, Willoughby, NSW, 2068.
Ph; +61 2 9958 7655; Fax: +61 2 9958 8002; Email: asum@asum.com.au

ASUM relies on information suppplied by organisers for non ASUM events included in the calendar. No responsibility is taken for incorrect information and mebers are advised to contact event organisers direct

ASUM Ultrasound Bulletin February 8: 1: 56–63

Abstracts 34th Annual Scientific Meeting 2004 Sydney, New South Wales – Part two

Volume ultrasound of the pelvic floor in the assessment of puborectalis muscle and levator hiatus

Hans Peter Dietz, RPAH Sydney, NSW and Anneke Steensma, RPAH Sydney, NSW

Objectives

The puborectalis muscle is thought to play a major role in pelvic floor dysfunction. To date, assessment has been limited to palpation and MRI. 3D pelvic floor ultrasound can now also be used for this purpose. This study was designed to define biometric indices and the prevalence of major abnormalities of this muscle in urogynaecological patients.

Methods

Two hundred and seven women referred for urodynamic assessment underwent translabial ultrasound using 3D capable systems, supine and after voiding. Volumes were obtained at rest, valsalva and levator contraction and were analysed by the second author (blinded against clinical data). Levator avulsion was diagnosed in rendered axial volumes if there was detachment from the pelvic sidewall. Atrophy was diagnosed if there was marked asymmetrical thinning (> 50%) of the muscle. Hiatal diameters and areas were measured in the axial plane, at the site of minimal AP diameters.

Results

Major morphological abnormalities were observed in 15 women (7.6%). Levator avulsion was seen in 10 cases (5%), most on the patient's right (n = 8). Marked asymmetry of the levator was observed in five cases (2.6%). There was no correlation between incontinence or prolapse and levator asymmetry/defects. Hiatal area (mean 13.9 cm^2 at rest and 19.5 cm^2 on Valsalva) was weakly associated with age (on Valsalva, r = 0.16, P = 0.028) and parity (at rest, p = 0.003, on Valsalva, P = 0.016), but not with incontinence. Hiatal area at rest correlated with cystocele (P = 0.003) and rectocele (P = 0.004) but not with uterine descent. For levator hiatus on Valsalva, this correlation was stronger (cystocele, P < 0.001, uterine descent P = 0.032, rectocele, P < 0.001). Hiatal area was no higher in women with levator defects or asymmetry.

Conclusions

Abnormalities of levator anatomy and the dimensions of the levator hiatus can be demonstrated by 3D ultrasound. Unilateral avulsion of the puborectalis/ pubococcygeus muscle was found in 5% of women; most defects were right-sided (8/10). A smaller number showed evidence of unilateral atrophy (2.6%). There were no correlations between age, parity or incontinence and abnormalities of levator morphology. Hiatal area correlated with age, parity and pelvic organ descent.

Assessment of the cervix including placenta previa

Harris J Finberg, Phoenix Perinatal Associates, United States

Sonographic evaluation of the cervix is an important adjunct to the clinical assessment and management of premature labor, incompetent cervix, and placenta previa. The cervix is most clearly and accurately imaged transvaginally. Translabial scans are frequently also diagnostically adequate, but transabdominal imaging is often unsatisfactory, subject both to obscuration by presenting fetal parts and to various artifacts.

In term labor, premature labor, and incompetent cervix, the pattern of cervical changes is very similar, with dilation and effacement starting at the internal os and proceeding distally. Funneling or beaking, the presence of amniotic fluid extending for a variable distance into the endocervical canal from the internal os, may provide early evidence of risk for preterm delivery.

The single best measurement for risk of preterm delivery is the residual closed length of the cervix, from deepest extent of fluid at the internal end of the endocervical canal to the external os. For every millimeter shorter than 40 mm length, the relative risk (RR) of preterm delivery increases. At 28 weeks, cervical length 30 mm has RR 5.4, and 22 mm has RR 13.9 for delivery at less than 35 weeks form the last menstrual period.

The earlier in pregnancy placenta previa is diagnosed, and the more peripheral the portion of the placenta that overlies the cervix, the more likely it is that previa will resolve before delivery. About half of central previas seen before 20 weeks will resolve, and over 95% of peripheral previas will resolve by delivery.

An ectopic pregnancy current management concepts

Simon Meagher, University of Melbourne, Vic

Transvaginal ultrasound plays a role not only in the diagnosis but the management of tubal and non-tubal ectopic pregnancies. The diagnosis relies upon the interpretation of the ultrasound findings in conjunction with the quantitative beta-hCG and clinical findings. Following the diagnosis there are three principle treatment options, which include:

1 Expected management
2 Chemotherapy; in principle methotrexate and
3 Surgical excision

This talk addresses the emerging biochemical markers of ectopic pregnancy, which may be used as a guide to management. The specific ultrasound findings, which guide patient selection of appropriate treatment, will also be discussed.

Ultrasound of the shoulder, a current perspective

Rob McGregor, Australia

Examination of the shoulder joint is by far the most common musculoskeletal ultrasound examination performed in Australia. The ultrasound study of the shoulder has never achieved the acceptance of so many other ultrasound studies. Indeed many referring and reporting physicians express great reservations regarding shoulder ultrasound and are either reticent or completely unwilling to trust the scanning results.

With this paper I will give my thoughts on the current status of shoulder sonography and the potential for this study into the future.

Dynamic shoulder ultrasound

Neil Simmons, SA

Sonography of the shoulder has become so commonplace and is performed by so many people that it is easy to be complacent about our effectiveness in this examination.

I should like, by reference to different cases, to emphasise the need for a thorough approach to the shoulder. These cases demonstrate the need for a clinical examination by the sonographer/radiologist, the importance of an adequate history and the essential nature of preliminary x-rays. The increasing importance of intervention in the shoulder will be discussed. Reference will also be made to new techniques and to possible post-surgical complications which may be overlooked.

The importance of the acromioclavicular joint will be

discussed, and a radiological technique for demonstrating degeneration will be shown.

The importance of the team approach between the sonographer and radiologist will be emphasised.

Sonographic assessment of the painful elbow

Stephen Bird, SA

This presentation will outline the scope of ultrasound as a diagnostic tool in patients complaining of a painful elbow. Elbow injuries are very common and often manifest as long term, debilitating workplace related injuries. Elbow injuries commonly have significant social and financial implications, as common extensor and flexor tendonosis is most prevalent amongst middle aged blue-collar workers.

Sonography can demonstrate a wide range of pathologies which may to give rise to elbow pain. All facets of elbow ultrasound will be discussed ranging from the common 'tennis elbow' to the more exotic nerve entrapment syndromes.

Can you put some colour on that?

Rob McGregor, ACT

There has been steady development and progression of the ultrasound equipment available to sonographers and physicians for the assessment of musculoskeletal structures. Within that development the sensitivity and thus application of colour Doppler and 'angio' techniques has rapidly broadened.

This paper will examine the latest technical developments and how the role of ultrasound can be widened as a result.

Interventional musculoskeletal ultrasound

Neil Simmons, SA

Ultrasound has been increasingly used to guide needles into soft tissues. The musculoskeletal system is no exception. If a region or an area is visible on the screen it is possible to guide a needle into it.

In my practice, the most common reason for intervention is injecting substances. Aspiration is much less common and biopsy is very rare.

Results of a survey of 200 consecutive interventions will be given and an analysis of the results made. This will include selection of needles and syringes. The benefits of various angles of approach will be discussed.

Reference will be made to techniques for various parts of the body. In some areas there are anatomical variations that need to be borne in mind and these will be discussed. The use of colour Doppler in discerning the position of vessels (so as to avoid them) and also in demonstrating neovascularisation of tendinopathy will be discussed.

Relevance of nerve measurements in the diagnosis of 'entrapment syndrome'

Lisa M Briggs, NSW

Is the application of nerve measurements instrumental in the diagnosis of "entrapment" type syndromes?

Entrapment type syndromes such as Carpel tunnel at the wrist involving the median nerve or the ulnar nerve at the elbow through the cubital tunnel.

This presentation is designed to be a 'food for thought' discussion with a 'suggestive' tone.

Do we as a group, rely on nerve measurements alone, and if so, how do we implement an appropriate standard of measurement, or do we consider other factors ie. SOL, systemic changes, work habitat etc.

This is not a presentation based on statistics, more so on your comments and experience with respect to nerve measurement in the diagnosis of 'entrapment syndromes'.

Through this presentation ultrasound images of the nerves will be shown demonstrating the epineurium of the nerve, facicles of the nerve and the 'gliding' nerve.

Dynamic scanning is an essential application in the probable diagnosis of 'entrapment syndrome' which can be clearly demonstrated with the use of ultrasound.

Maximising the value of vascular ultrasound reports – what the clinician wants to know

Philip J Walker, University of Queensland, Qld

A sound knowledge of vascular anatomy, vascular diseases and the therapeutic options and strategies for their treatment is essential for the individual performing a vascular duplex ultrasound examination and providing a report which is of value to the clinician. Knowledge of previous interventions and what the clinician is considering for the patient's management can minimise wasted examination time and ensure that the clinician is provided with all the information required. This requires good communication with the referring clinician. A study is more valuable if a positive diagnosis for the patient's symptoms and signs can be provided, rather than simply ruling out a possible diagnosis.

It is important to comment on the technical adequacy of the study, the reasons (if any) that a study was technically suboptimal, and whether it is worth attempting to repeat the study on another day with better patient preparation or if an alternative imaging modality would be required. The information required from the study may be very specific or of a more general nature.

In the absence of a very specific request, it is important to provide the clinician with a comprehensive set of data so that they can interpret it in the context of the clinical scenario. Careful documentation of the anatomic location and extent of disease and the Doppler or B-mode data on which the disease severity is based is mandatory. This is often most concisely displayed on a worksheet. A well documented worksheet is far more valuable than pages of meaningless written text. Information that may impact on a possible intervention (eg. the height and surgical accessibility of the carotid bifurcation) and opinions of a subjective nature can be helpful for particular scenarios (eg. which is the best target artery for a peripheral arterial bypass?). Comparison with previous studies, noting changes that have occurred since the earlier study, are important. It is helpful to summarise the results of the study in a concise conclusion section.

This presentation will discuss the various vascular DUS examinations (arterial and venous) and the information usually required by clinicians. Examples of worksheets and reports will be presented.

Duplex follow-up of endovascular aortic stent grafts

Kathleen A Carter, Eastern Virginia Medical School & Vascular & Transplant Specialists, United States

Introduction

Aortic endovascular stent graft repair has become an important alternative to standard surgical treatment of aortic aneurysm. These devices are placed transluminally through small femoral incisions and deployed remotely. There is a great deal of patient acceptance for the procedure as it is less invasive than traditional surgical repair with a shorter hospital stay, less stress on the cardiopulmonary system and a much quicker recovery time. The trade-off for the advantages is that the endovascular repair requires careful follow-up.

The long-term durability is not known and there are complications associated with endovascular repair that

are not found following open surgical repair. Foremost among these complications is endoleak. Endoleak has been identified with all devices implanted to date and occurs in 2.4–44% of reported endovascular repairs. There has been insufficient natural history data to determine the appropriate management of endoleak. Some endoleaks spontaneously thrombose while others persist for long periods of time. Endoleak can occur immediately following placement or as late as 48 months or more. The presence of endoleak provides the potential for aneurysm expansion and places the patient at risk for rupture. It is also not clear which types of endoleak would lead to aneurysm expansion and which would be clinically insignificant. For all of these reasons, careful and perhaps life long follow-up is necessary.

The types of endoleak, will be reviewed as well as the appropriate protocol for ultrasound identification of endoleaks and other complications associated with endograft placement.

This duplex ultrasound exam is more technically challenging than most vascular laboratory studies but in the hands of experienced and informed vascular technologists/sonographers it can be an accurate way of identifying complications commonly associated with these devices. The main keys to success in these challenging exams include proper high-resolution equipment with high quality Doppler, enough time allowed for the study and interest and experience of the examiner.

Evaluation of TIPS – an update

Roger P Davies, Woodville Diagnostic Imaging, SA

Trans-jugular intrahepatic porto-systemic shunt (TIPS) is a shunt between the portal vein and the IVC.

TIPS is now considered the procedure of choice for management of refractory variceal bleeding.

The two main complications of TIPS are hepatic encephalopathy and shunt malfunction.

Liver volume, extent of ascites and portal vein flow can all be assessed pre-procedure.

The pre-TIPS duplex sonographic study should include determination of patency, velocity, and flow direction in the main, right, and left portal veins and in the hepatic artery; and the hepatic venous anatomy. Pre tips portal vein velocities are typically 20 cm/sec, increasing to greater than 40 cm/s post TIPS. Hepatic artery peak systolic velocities are typically less than 100 cm/sec pre TIPS, increasing to 130 cm/s post TIPS.

High-velocity blood flow (mean peak velocity, 135–200 cm/sec) is typically seen within patent, well-functioning shunts.

TIPS shunts have a limited patency due occlusion or stenosis of the intrahepatic tract or stenosis of the outflow hepatic vein. Onset of shunt stenosis is unpredictable, so percutaneous intervention are recommended to maximise TIPS patency. Doppler ultrasound is the most commonly used noninvasive tool to assess shunt patency.

Evaluation of maximal angle-corrected velocity measurements in the portal vein proximal to the TIPS as well as flow velocity within the stent itself should be performed and recorded. A threshold mid-shunt velocity of less than 60 cm/sec or main portal vein velocity of less than 40 cm/sec will allow shunt dysfunction detection sensitivity of around 86%, and a specificity of 54%. A reduction in flow on serial follow-up improves the accuracy of detection. Secondary signs of shunt dysfunction include increasing ascites or interval change from hepatofugal to hepatopetal intraparenchymal portal venous flow or recurrent variceal haemorrhage.

There are many pitfalls and artifacts that can potentially interfere with the proper performance and interpretation of Doppler studies in patients with TIPS.

Echo-enhanced Doppler sonography provides images of TIPS like those of angiography and allows morphologic assessment of the shunt, complementary to pulsed Doppler waveform analysis.

Injection of uokinase improve ultrasound-guided therapy for ovarian endometriosis cyst

Jing Zhang, Department of Ultrasound, China

Objective

To establish a method of using urokinase to dissolve clots within ovarine endometriosis cyst and to improve the outcome of its ultrasound-guided aspiration and treatment.

Method

The study consists two parts: In vitro experiment the urokinase was dilutied with saline at different concentration levels. The content of ovarian endometriosis cyst was aspirated under ultrasound guidance. The specimen was added with urokinase saline of different concentration levels, and was observed under the microscope one minutes later. In clinical investigation, 27 ovarian endometriosis cysts were punctured under ultrasound guidance. Urokinase saline was injected in 14 cysts and in control group saline was injected in 13 cysts. The thickness of cyst wall, the sizes of coagula in the cysts and aspiration rate were recorded before and after injection. The ethanol was injected into the cyst cavity to coagulate the cyst wall after the cyst cavity was douche clearly. Results: Histological observation shows that the size of coagula was significantly smaller in 500U/ml urokinase group (122.6 ± 45.6 nm) than that in control group (28.7 ± 20.4 nm, $F = 31.32$, $P < 0.001$). Clinically, after urokinase injection, the coagula adjacent to the cyst wall decreases in size and becomes eventually invisible on the real time ultrasound image. The aspiration time was significantly shorter in urokinase group (14.8 ± 5.9 ml/min) than control group (4.4 ± 2.5 ml/min; $t = 2.6382$, $P = 0.0016$). After ethanol treatment, the patients were followed up for 4.2 ± 4.1 months in urokinese group, and none experienced recurrence. The control group was followed up for 3.9 ± 3.2 months, in which one case was confirmed recurrence by ultrasound ($x = 0.01$, $P = 0.9248$).

Conclusion

Urokinase safely and effectively dissolves the coagula within endometriosis cyst and those adjacent to the cyst wall, which makes the aspiration procedure easier and improves the ethanol coagulation effects.

The changes in umbilical artery Dopplers after steroid administration in placental insufficiency

Vasundhara Kaushik and John Smoleniec Feto-Maternal Unit Liverpool Hospital, NSW

Aim

To study the changes in umbilical artery Doppler flow velocity waveforms post steroid administration in fetuses with placental insufficiency as evident by absent or reversed end diastolic flow.

Study design

A retrospective analysis of umbilical artery Dopplers before and after steroid injection in fetuses with absent or reversed end diastolic umbilical artery flow.

The data was collected by searching the fetal medicine viewpoint data base and medical records at Liverpool Hospital. We identified 10 pregnancies monitored in Feto-Maternal unit since 1999.

Results

Umbilical artery diastolic flow improved with in 24 hours after betamethasone administration in seven pregnancies. The umbilical artery Dopplers remained unchanged in three pregnancies.

Conclusions

In pregnancies with absent or reversed umbilical artery flow, antenatal steroid administration is associated with transient positive umbilical artery flow.

Detrusor muscle thickness in young nulligravid women

Hans Peter Dietz, RPAH Sydney, NSW and Barton Clarke, RWH Brisbane, Qld

Objective

Detrusor muscle thickness has been shown to be associated with symptoms of the irritable bladder and urodynamically diagnosed detrusor overactivity. Increased detrusor thickness may be due to detrusor hypertrophy in women with bladder irritability although it remains unclear as to whether detrusor hypertrophy is the cause or effect of such symptoms. The aim of this study was to define detrusor muscle thickness in young nulligravid Caucasian women.

Methods

Fifty-two young nulligravid volunteers underwent 3D volume ultrasound of the pelvic floor using a Kretz Voluson 730 system with 7–4 MHz Volume transducer with automated image acquisition. These volumes were retrospectively analyzed for bladder wall thickness. Two measurements were taken at both the trigonal area and the bladder dome. 14 women were excluded due to bladder volumes over 100 ml.

Results

Average age was 20.5 (17.9–24.2) years. Six women reported stress incontinence, one urge incontinence, six frequency and one nocturia. Average bladder neck descent was 18.0 (SD 9.5) mm. Average detrusor thickness at the trigonal site was 4.1 (SD 0.6, range 3.3–5.8) mm and 2.8 (SD 0.7, range 1.3–4.6) mm at the dome. This difference was significant ($P < 0.001$). Average measurements for both sites showed a mean of 3.4 (SD 0.5, range 2.3–4.7) mm. Symptoms of frequency, nocturia and urge incontinence were not associated with increased detrusor wall thickness measurements.

Conclusions

Young healthy nulligravid Caucasian women appear to show detrusor wall thickness measurements well below the published cutoffs for detrusor hypertrophy (5 mm) when dome measurements alone or the average of dome and trigone were considered. This also applies to the few women in this group who were reporting symptoms of the irritable bladder. It therefore appears likely that increased detrusor muscle thickness or detrusor hypertrophy is an acquired condition.

Ultrasound assessment of the postpartum uterus

Rebecca Deans, RPAH Sydney, NSW and Hans Peter Dietz, RPAH Sydney, NSW

Objective

Ultrasound of the post partum uterus has long been used as a means of evaluating women presenting with puerperal morbidity. However, to date no studies have been performed to assess the role of ultrasound in the immediate post partum period (within 24 hours) as a predictor of maternal morbidity. The goal of this study was to assess the appearance of the post partum uterus and correlate these findings with maternal morbidity.

Methods

Ninety-four women were recruited in the Labour Ward of a tertiary hospital and assessed within 24 hours after delivery. Transabdominal ultrasound was performed, and measurements of intrauterine contents were obtained in all three dimensions, separately for the fundus and the lower segment, cervix and vagina. All recruited women were contacted for a telephone interview between 1–4 months following their delivery, querying morbidity such as post partum haemorrhage, pyrexia, prolonged hospital stay, follow up investigations and surgical intervention.

Results

Of 94 women, 2 were lost to follow up. The average age was 30 years. Median parity was 1 (range 1–5) Most had delivered by NVD (n = 92), two by caesarean section. Three had undergone manual removal of the placenta. Upper segment contents had an average dorsoventral thickness of 13.8mm, and an average volume of 35.6 cm3. The lower segment, cervix and upper vagina held considerably more material with an average volume of 54.8 cm^3. Twenty-two of the participants experienced febrile illness following delivery, and 19 were commenced on antibiotics. None experienced a secondary postpartum haemorrhage or needed a procedure for endometritis or retained products. While a trend was found towards lower intrauterine volume with increasing time since delivery, and while parity was associated with higher total volumes ($P = 0.048$), we did not detect any correlations between intrauterine volume and postnatal morbidity.

Conclusions

Ultrasound in the immediate post partum period may show findings that would be regarded as highly abnormal after first or second trimester miscarriage. It appears that even rather large volumes of intrauterine contents are not associated with significant morbidity and can be accepted as normal.

Lateral cerebral ventricular measurement – a new perspective

Vanessa Pincham, Sydney Ultrasound for Women, NSW and Andrew C McLennan, Sydney Ultrasound for Women, NSW

The diagnosis of cerebral ventriculomegaly can be made at the 18–20 week ultrasound. Lateral cerebral ventriculomegaly can be a manifestation of neural tube defect, fetal infection, chromosome abnormality or developing hydrocephalus. Isolated cerebral ventriculomegaly may result in abnormal neurological development (about 7% for mild ventriculomegaly, up to 50% with severe ventriculomegaly).

Lateral cerebral ventriculomegaly is defined as a lateral ventricle atrial width of greater than 10 mm (or three standard deviations above the mean). It has been graded as mild (10–11.9 mm), moderate (12–14.9 mm) and severe (greater than 15 mm). The LV atrium lies at the junction of the frontal, temporal and occipital horns of the lateral ventricle. Its sonographic features and boundaries are often poorly defined in the literature. This leads to the publication of variable 'normal' ranges for ventricular measurement (5.0 ± 1.0 mm to 7.6 ± 0.6 mm).

The lack of precise criteria to ensure reproducible, accurate measurements is surprising given the important ramifications of these measurements. This paper will examine the experience of Sydney Ultrasound for Women in establishing a protocol for lateral ventricle atrial measurement. A normal range for atrial measurement will be assessed as will inter-observer measurement variability using these criteria. The suitability of using 10mm as the upper limit of normal will also be reviewed along with the complex sonographic and counselling issues inherent in this assessment.

Fetal growth: an electronic record for ultrasound assessment of fetal measurements

David Davies-Payne, Starship Children's and National Women's Hospital, Auckland, New Zealand and Rita Teele, National Women's Hospital & Starship Children's Hospital, New Zealand

An electronic record has been developed to chart fetal measurements between 12 and 42 weeks. It has been written in Objective-C using the Cocoa toolkit running on Apple Mac OS X.

The software allows for the easy input and clear display of trends in fetal growth parameters. Previous examination data are stored and available for subsequent comparison. The estimated date of delivery can be accurately calculated by a number of methods. Different standards of fetal growth are available, including ASUM 2001 and Hadlock 1982.

Growth charts are exported in JPEG format for importing into a PACS system or other electronic medical record. Direct DICOM compatibility is planned for the future.

Aims

Our project aimed to measure fetal renal volumes in singleton pregnancies at different gestational ages from 17 to 41 weeks from 01/11/2003. Our hypothesis is that fetal renal volume increases with gestational age and fetal weight. This project was approved by the Ethics Committee at Nepean Hospital.

Research methodology

Patients selected had singleton fetuses between 17 and 41 weeks gestation in this cross sectional study. Gestational age was estimated from the first trimester ultrasound measurement, or the last normal menstrual period if there was not an earlier scan.

The 3D volume sweep was performed using the VOCAL mode on the 3D Ultrasound Voluson 730 machine in our department. When the correct plane for seeing both fetal kidneys was found a single sweep was taken. This volume scan lasts 3–4 seconds.

The image obtained was stored and volume analysis performed later after the patient's normal examination was finished. The image undergoes a series of rotations of 30 degrees so six image calculations are made by tracing the contour of the kidney in each plane.

The reference image selected is automatically rotated and after each contour is stored and the volume of the kidney is calculated by the machine. Each fetal kidney was measured three times by two separate investigators blinded to the results of the other – this is done from the one sweep obtained.

In the first 40 cases, the inter-observer reliability was tested using Cronbach's alpha, which is a coefficient of reliability and was measured at .922, indicating that the inter-observer reliability is high. A reliability coefficient of .80 or higher is considered as "acceptable" in most research applications.

Results

The results on the first 250 patients are presented. A graph has been produced showing normal fetal renal volumes throughout pregnancy. The nomogram will be presented from these initial cases. The poster presentation will also plot a number of abnormal cases against the nomogram, demonstrating the value of 3D volume assessment.

Abnormal fetal feet – the differential diagnoses

David Fauchon, Nepean Hospital, University of Sydney, NSW, Ron Benzie, Nepean Hospital, University of Sydney, NSW and Sharon Watson, Nepean Hospital, University of Sydney, NSW

This poster presentation follows the case of a pregnancy where the fetus was diagnosed with bilateral feet abnormalities at the 18-week ultrasound. There follows a progression of findings that develop throughout the pregnancy, other than the feet abnormalities. An amniocentesis was performed which returned a normal karyotype for this fetus. Initial investigations have been made by Geneticists post partum, and at present the phenotype does not clearly fit a known syndrome.

Included in the presentation will be a generalised discussion of feet abnormalities and differential diagnoses. Some of this will include a discussion of Brachydactyly, Clinodactyly, Polydactyly and Syndactyly. Included in the poster will be 2D ultrasound images, 3D ultrasound images, postpartum photographs and x-rays of the affected baby's feet in the case under review.

Free muscle transfer – a case study

Susan L Campbell Westerway, MIA, NSW, Phil Lucas, MIA, NSW and Michael Tonkin, Dept Surgery Sydney University, NSW

This poster describes a case of a free muscle transfer on a 44-year-old male following a brachial plexus injury due to a motorbike accident.

The FMT involved the removal of the gracilis muscle from the left thigh. The branch of the obturator nerve to the gracilis was divided and removed along with the gracilis vein and artery. The muscle was then passed subcutaneously from the right cubital fossa, woven twice into the biceps tendon and attached to the acromion and deltoid muscle. An end to side anastomosis of the gracilis artery to the axillary artery and the gracilis vein to the axillary vein was performed. The obturator nerve was attached to the accessory nerve.

Ultrasound and MRI was performed pre- and post-surgery to show the state of the muscles, arteries, veins and nerves.

2-dimensional and 3-dimensional assessment of a fetal neck mass

Brendan J Mein, Nepean Hospital, University of Sydney, Penrith, NSW and Ron J Benzie, Nepean Hospital, University of Sydney, NSW

This case outlines the role of 2D and 3D ultrasound in the assessment of a large unilateral neck mass. The patient first presented to Perinatal Ultrasound at 25 weeks gestation after an outside scan indicated a possible cystic hygroma. Using 2D and 3D ultrasound a unilateral, left-sided neck mass measuring 4.3 x 4.7 x 2.7 cm containing multiple small cysts with no evidence of increased vascularity with colour Doppler was shown.The patient was reviewed regularly until delivery with only a small increase in size of the neck mass noted.

The initial diagnosis at the 25-week scan was a possible teratoma with a differential diagnosis of cystic hygroma, lymphangioma or a branchial remnant.

The patient was delivered by an elective caesarean section at 39 weeks gestation and a 5-month postnatal MRI was performed. The findings of the MRI were suggestive of a 8.5 cm multiloculated cystic lesion consistent with a supraclavicular lymphangioma.

New imaging method for inside architecture of bone using ultrasound signals

Fumio Nogata, Gifu University, Japan

Since osteoporotic changes appear initially in the cancellous bone and cortical thinning can be detected only at an advanced stage, we must develop a method to inexpensively and non-invasively assess the mechanical integrity of in vivo bone tissue of an individual. We also need to understand bone density that can directly relate fracture incidence trabecular density and orientation, and architecture-related strength of cancellous bone.

Ultrasound has long been considered to have potential value for the assessment of bone fragility on the theoretical basis that its propagation characteristics (velocity, signal attenuation, frequency and etc.) are influenced both by bone density, by material elasticity and by architecture along the travel path.

In the present report, a new technique has been proposed for imaging trabecular architecture of spongy bone using ultrasound A-mode signals from a transducer of medical ultrasound apparatus, which permits to diagnose osteoporosis disease from the mechanical intergrity viewpoint. The technique can be established by finding a method to distinguish between bone and bone marrow. Firstly, the A-mode signal intensity was fitted by the form, $A = Ao\exp(-Bx)$, where A, Ao, B, and x represent echo intensity, initial value of echo, attenuation factor, and distance, respectively. Then the curve was moved slightly downward or upward by multiplying with the coefficient k (0.9~1.2), and it was used as an index line to distinguish between bone and bone marrow. To clarify the validity of the proposed technique, we examined a bovine bone specimen and a spongy-shaped specimen made by ceramics. The pixel size for creating architecture was 0.2 (width) x 0.15 mm (depth) for bone marrow and 0.2 x 0.3 mm for bone substance, and the pixel size differs due to the difference in wave speeds. The image technique was capable to create an image size of ~10 mm depths from the surface of cortical bone. We also tried to visualise the heel bone.

Sonographic fetal biometry: are current western standards applicable to a multi ethnic population in UAE?

Sarath L Weerasinghe, FMHS, UAE University, United Arab Emirates, Hisham Mirghani, FMHS, UAE University, United Arab Emirates, Nawal Osman, United Arab Emirates and Earl Dunn, United Arab Emirates

Objectives

1 To determine any inter – ethnic variation.
2 To determine whether the use of western standards are appropriate.

Design

Prospective cross sectional study.

Methods

One thousand one hundred and eighteen pregnant women with uncomplicated singleton pregnancies from 14 to 42 weeks were scanned. Each fetus was measured only once. The measurement of biparietal diameter (BPD), head circumference (HC), abdominal circumference (AC) and femur length (FL) were performed as per established criteria. Estimated fetal weights (EFW) were calculated using two formulae (Hadlock).

The means and standard deviations of each parameter at each gestation were calculated. Regression analysis of the measurements versus ethnic groups and hospitals were performed and the significance at $p = 0.05$ calculated. The percentiles of the measurements at each gestation were derived using Z scores. The means of each parameter and EFW were compared with data from UK (Chitty & Altman) and US (Hadlock).

Results

1 The ethnic groups were: a) UAE 47.5% b) Other Arabs 38.4%, c) Asians 10.7% d) Others 3.4%.
2 Sources of patients a) Tawam hospital (53.4%, b) Al Jimi hospital 42.7% c) Primary health care centers 3.8%.
3 There were no inter ethnic differences ($p \geq 0.05$) in the measurements at each gestation
4 No significant differences in the inter hospital measurements $p \geq 0.05$).
5 Comparison of mean values of the measurements and EFWs for each gestation with UK and US data showed no significant differences.

Conclusions

Fetal measurements of the study population showed no significant ethnic differences. Centile charts for the measurements and EFWs have been developed for clinical use. There were no significant difference between the Al Ain, UK and US biometry data. Western standards can be used for the UAE population

Measurement of the diameter of the umbilical cord at 11 weeks and 0 days to 13 weeks and six days gestation

Frances E Miceli, Nepean Hospital, University of Sydney, NSW, Ron Benzie, Nepean Hospital, University of Sydney, NSW and Ravy Thavaravy, Nepean Hospital, NSW

Objective

To establish Australian charts of normal diameter of umbilical cord (DUC) measurements at crown rump lengths (CRLs) of 45–84mm corresponding to gestations of 11 weeks 0 days to 13 weeks 6 days.

Methods

The DUC was measured in 750 patients who presented to the Christopher Kohlenberg Department of Perinatal Ultrasound for routine nuchal translucency screening, PAPP-A and beta-hCG. All patients in this study were single live gestations with a CRL of 45–84 mm as per the inclusion criteria of the Nuchal Translucency Program as established by the Fetal Medicine Foundation.

Results

The DUC was successfully measured in all cases. Preliminary results appear to indicate that there is no association between abnormal DUC and fetal aneuploidy. However the DUC appears to increase in diameter with increasing CRL in all cases.

Conclusion

In the first trimester at CRL of between 45–84 mm the DUC appears to increase with gestation. This data when combined with the already known risk assessment of nuchal translucency, PAPP-A and beta-hCG is being used to establish Australian charts of normal measurements for DUC. It may also prove useful in future studies of the potential association with DUC and fetal abnormalities.

Diastematomyelia – a case review

David E Fauchon, Christopher Kohlenberg Department of Perinatal Ultrasound, Nepean Hospital, NSW and Ron Benzie, Nepean Hospital University of Sydney, NSW

Diastematomyelia is a congenital defect of the spinal cord. The defect occurs when the spinal cord is divided by an osseous or fibrocartilaginous septum. Sonographically, the septum is demonstrated as a bony spur between the posterior ossification centres when scanning the spine coronally. There is also a widening of the ossification centres at the level of the spur.

This poster presentation will give a description of Diastematomyelia, the sonographic features associated with it and the differential diagnoses. Included will be a case review of Diastematomyelia, complete with ultrasound images in 2D and 3D planes antenatally, MRI images antenatally, and postnatal x-rays.

A new system for assessment of the nonlinearity parameter B/A: phantom study

Yasutomo Fujii, Jichi Medical School, Japan, Nobuyuki Taniguchi, Jichi Medical School, Japan, Iwaki Akiyama, Shonan Institute of Technology, Japan, Jing Wen Tsao, Aloka Co Ltd., Japan and Kouichi Itoh, Department of Clinical Laboratory Medicine, Jichi Medical School, Japan

Objective

To assess the feasibility of a new system that uses the finite amplitude method, and makes possible the assessment of the nonlinearity parameter B/A, but not of the effect of attenuation and backscatter, we adopted a method for agar-gel phantoms, using varying lipid concentrations.

Methods

Instead of calculating the nonlinearity parameter B/A value, we evaluated the value, which is determined by plotting the measured values of the ratio of the amplitude of the second harmonic component to that of the fundamental component, a ratio that is a function of, on the basis of the following equation: h = d/dz {A2(z)/A(z)} o {A0(2f0)/P0(f0)} = (B/A+2) o2πf0/4 C03. The agar-gel phantoms of various lipid concentrations (containing 0, 2, 10, or 20 g/100 ml soybean oil lipid emulsion) were studied in this investigation.

Results

There was an almost linear agreement between the h value and the lipid concentration of the phantom.

Conclusion

This new system was considered usable for evaluating h as the lipid content.

Three dimensional ultrasound estimation of fetal renal volumes in the second and third trimesters

David E Fauchon, Christopher Kohlenberg Department of Perinatal Ultrasound, Nepean Hospital, University of Sydney, Penrith, NSW, Ron Benzie, Nepean Hospital, University of Sydney, Australia, Brendan Mein, Nepean Hospital, University of Sydney, Penrith, NSW and Ravy Thavaravy, Nepean Hospital, University of Sydney, NSW

Prenatal diagnosis of neu-laxova syndrome – a case review
Racheal Martin, Nepean Hospital, NSW

Neu-Laxova syndrome is a rare, lethal autosomal recessive condition with characteristic ichthyosis, facial dysmorphic features, intrauterine growth restriction, microcephaly, central nervous system anomalies, limb deformities, hypoplastic lungs and oedema. Forty-two cases of Neu-Laxova syndrome have been reported, with only four diagnosed prenatally (Prenat Diagn 2002 Feb; 22 (2): 118–120). Females account for slightly more than half of the cases and many are carried to full term. All have had normal karyotypes. In reported cases a maternal history of spontaneous abortions is common and parental consanguinity is frequently present.

In this case report, the mother had recently arrived from Samoa and thought to be at approximately 30 weeks gestation when she presented to Nepean Hospital. This was her first pregnancy and she had no prenatal care. Sonography revealed a discrepancy between head, abdomen and limb measurements. There was IUGR. Multiple abnormalities were noted with microcephaly and ventriculomegaly, oedematous neck folds and absent cerebellum. There were bilateral talipes, rockerbottom feet and clinodactyly of the digits on both hands. There was marked polyhydramnios and restricted fetal movement. 3D ultrasound of the fetal face showed a short flat sloping forehead and wide set eyes. The nose was broad and the ears low set.

Amniocentesis showed a normal 46XX karyotype. She went into spontaneous labour one week later, with apgars of 1 at 1 minute and 5 minutes. The baby died approximately 20 minutes after delivery. Postmortem concluded the findings were consistent with Neu-Luxova syndrome.

This case report aims to show the possibilty of reliably diagnosing Neu-Laxova Syndrome prenatally by maternal history and demonstrating the sonographic features described.

The case of the disappearing kidneys
Diane B Oppawsky, Monash Medical Centre, Clayton, Vic

Purpose
To perform a twenty week fetal anatomy survey and subsequent 26 week ultrasound on a fetus of a 29-year-old mother (P2G1), with a past history of the premature birth and subsequent death of a male child at 33 weeks gestation. The death followed a normal fetal anomaly scan at 19 weeks and an uneventful pregnancy. Post mortem showed the child died of pulmonary hypoplasia associated with Potter sequence. The mother had already had a normal 16-week ultrasound for this pregnancy at another hospital.

Methods
Both the routine 18–20 week ultrasound and the 26 week ultrasound were performed on a Philps ATL5000 scanner using a C7-4MHz transducer. The fetal anatomy was assessed according to ASUM guidelines.

Results
The routine 18–20 week anomaly scan was performed. The fetus appeared to be a structurally normal male fetus of gestational age, 20 weeks and 4 days. The kidneys were present and of normal appearance. The follow-up scan at 26 weeks and 4 days, however was grossly abnormal. While the fetus was still viable and its biometry within normal limits, the bladder was found to be empty, there was no amniotic fluid at all and the kidneys were grossly abnormal in appearance. Following these results the fetus was terminated and post mortem was conducted. The fetus was found to have a rare form of Potters, renal tubular dysgenesis (RTD), which is thought to have an autosomal recessive mode of inheritance. It is characterised by loss of the proximal renal tubules which leads to cessation of urine production, subsequent oligohydramnios, Potters sequence, respiratory insufficiency and calvarial hypoplasia.

Conclusion
When scanning mothers with a history of fetal kidney problems, it is imperative to monitor the fetus beyond the 18–20 week scan. RTD is characterised by late onset oligohydramnios.

Upper abdominal masses: a diagnostic dilemma
Sharon M Watson, Christopher Kohlenberg Perinatal Ultrasound Department, Nepean Hospital, University of Sydney, NSW and Ron Benzie, Nepean Hospital, University of Sydney, NSW

This poster will review two cases of upper abdominal masses and the possible differential diagnoses suggested by both serial antenatal and post natal ultrasound examination.

Case 1: right upper quadrant mass

A 36-year-old primigravida woman, with preeclampsia and gestational diabetes was scanned repeatedly between 29 weeks and 34 weeks gestation. At approximately 32 weeks gestation the antenatal scan showed a well circumscribed echogenic mass with cystic components in the region of the right adrenal. Blood flow within the mass could not demonstrated with colour Doppler ultrasound.

The postnatal ultrasound examination, confirmed the antenatal findings. Locating the hyperechoic mass in the right subdiaphragmatic area with possible extension into the pleural space, with associated compression of the IVC and hepatic vasculature. The lesion that was thought to be either an extra lobar pulmonary sequestration or a fatty tumour.

Case 2: left upper quadrant mass
In this second case a left upper quadrant mass was detected in a foetus of 38 weeks gestation. A complex predominantly cystic mass containing thin septations and solid material was identified in the region of the left adrenal on the initial examination. A neuroblastoma or adrenal haemorrhage were considered to be the most likely diagnoses. On subsequent imaging Wilm's tumour, lymphangioma, hamartoma and retroperitoneal teratoma were also considered as alternative pathologies.

Following delivery the child remained clinically well. There was no clinical evidence of adrenal insufficiency or elevated catecholamines. The abdomen was found to be soft with no palpable mass detected. The infants blood chemistry was essentially normal.

Both cases effectively illustrate the diagnostic difficulties encountered in clinical practice when these pathologies occur. A definitive diagnosis has as yet not been made on the basis of any specific sonographic findings in either instance. This issue will be addressed in our presentation.

Audit of detection of fetal cleft lip by ultrasound in central Auckland 1995–2000
Jenny M Mitchell FMHS and Peter Stone, University of Auckland, New Zealand

Purpose
To attain an audit of ultrasound screening for the detection of fetal cleft lip.

Methods
The study population included all babies born at National Women's Hospital during 1995–2000 with fetal abnormalities that were coded at discharge from the hospital using the international classification of diseases (9th revision clinical modification) and all terminations of pregnancy for fetal abnormality were audited for presence of cleft lip. Ultrasound scans were performed in many units in Auckland as well as National Women's hospital scanning department. Cases of isolated cleft palate were excluded. Cross checking was performed with the National Women's Ultrasound data base, surgical lists and patients' charts. An ultrasonography database was used to identify all cases

of cleft lip diagnosed before delivery.

Results
A total of 48 confirmed cases of cleft lip were identified in the study population of 43,343. Overall, 52% of the cases (26 of 48) were identified antenatally. Additional fetal anomalies were present in 32% of the cases (18 of 48). There was a better detection rate after 24 weeks gestation (52%) than at the 18–20 week morphology scan (36%). Compared with the 1988–89 audit the detection rate for 1995–1999 had improved from 10% overall to 52%, and for the year 2000 the detection rate was 75%, which is similar to the international reports.

Conclusions
Detection rates are improving with time, which is assumed with the use of good machines and education.

Misuse of ultrasound for entertainment in the United States
Paula S Woletz, American Institute of Ultrasound in Medicine, United States

Buyer beware? The non-medical use of diagnostic ultrasound has exploded in the United States, and with it, a growing controversy over when and how ultrasound should be used, and by whom. The American Institute of Ultrasound in Medicine's position on the prudent use of ultrasound includes the following statement: 'The AIUM strongly discourages the non-medical use of ultrasound for psychosocial or entertainment purposes.' Several other organisations have endorsed the 'Prudent Use' statement, and the US Food and Drug Administration has issued consumer alerts stating that, '[E]xposing the fetus to ultrasound with no anticipation of medical benefit is not justified.' Medical, ethical, financial, and regulatory considerations will be discussed.

The placenta including its umbilical cord insertion
Harris J Finberg, Phoenix Perinatal Associates, United States

Two unifying concepts, trophotropism and the role of the endometrial decidua, help explain a variety of important abnormalities of the placenta and of the cord insertion into the placenta.

Trophotropism is the tendency for the trophoblastic villi of the placenta to proliferate and grow towards regions of better blood supply and to atrophy or regress where blood supply is less adequate. This process allows remodelling and positional shifting (or migration) of the placenta. This concept helps explain the observation of regressing placenta previa and helps elucidate a mechanism by which succenturiate lobe, marginal and velamentous cord insertions and vasa previa occur.

Vasa previa specifically means the presence of blood vessels of the fetal circulation running along the chorionic lining of the gestational sac and overlying the internal os of the cervix. This may occur with a velamentous cord or with fetal vessels connecting a succenturiate lobe to the main portion of the placenta.

Placenta accreta, and its more deeply invasive increta and percreta variants, may occur in regions of deficient endometrial decidua, such as the scar from a prior caesarean section. In the presence if placenta previa in patients with one or more prior caesarean sections, the risk of placenta accreta is at least 25%. First trimester cases in which the gestational sac has implanted in a caesarean section scar will be shown. This is the first trimester diagnostic appearance of placenta accreta.

The umbilical cord revisited
Ronald J Benzie, Nepean Hospital, University of Sydney, NSW

This presentation will review the recent literature with emphasis on the need to re-evaluate our views of the umbilical cord as an organ worthy of closer attention in prenatal assessment.
Traditionally we have confined ourselves to counting the vessels in the cord and to preferring Doppler flow studies.

This review will demonstrate the need for closer morphologic study of the cord. The various physiologic and pathologic conditions that may be encountered will be discussed.

Doppler applications in urology and nephrology
Christian Nolsøe, Denmark

A wide range of clinical problems in urology and nephrology ranging from simple questions as to the presence of flow in main vessels to more subtle questions regarding the type of blood flow profile, can be addressed by Doppler ultrasound. Colour Doppler techniques including power Doppler and directional power Doppler gives a moving image of the blood flow that is similar to an angiogram. Pulsed Doppler displays the velocities of flowing blood in a selected area of a vessel as a spectral tracing from which deductions as to the effects of local abnormalities (eg. stenosis) and downstream changes (eg. increased or decreased resistance to flow) can be made. The two form a powerful combination for the analysis of vascular disorders, and should almost always be used together. The main application of Doppler ultrasound in urology lies in the assessment of the kidney and its vascular system, but also in scanning of the testes for suspected testicular torsion and the penis for suspected vascular impotency Doppler ultrasound have become a useful tool. Furthermore, flow of urine out of the ureteric orifices, the so called 'ureteric jet flow' can be investigated in cases of suspected stricture or occlusion of the orifice. In nephrology, of course, the main application is assessment of flow in the transplanted kidney, but also dialysis fistulae can be examined and possible causes of malfunction investigated.

Radiofrequency ablation guided by sonography
John P McGahan, University of California, Davis Medical Center, United States

Objectives:
1 To familiarise audience with the different uses of RF ablation
2 To demonstrate to the audience the use of ultrasound in guidance of RF ablation
3 To review possible pitfalls of radio frequency ablation

Current applications
Currently, radiofrequency electrocautery is utilised for ablation of hepatocellular carcinomas, and colon metastasis to the liver. Most colon metastases to the liver that have been treated with radiofrequency electrocautery have been colon metastases.

The reason for treating colon metastases rather than other metastases is the more favourable biology of colon metastasis compared to other metastases.

Other applications
Radiofrequency electrocautery has been used to treat a number of different areas within the body. Some of these may be guided by ultrasound. Ultrasound is very useful in guiding tumor ablation of the kidney and breast. These applications will be reviewed in this presentation.

References
1 McGahan JP, Dodd DD. Radiofrequency ablation of the liver: current status. AJR 2001; 176: 3–16.
2 Rosenthal DI, Hornicek FJ, Wolfe MW, et al. Percutaneous radiofrequency coagulation of osteoid osteoma compared with operative treatment. J Bone Joint Surg 1998; 80: 815–821.

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

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Format

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

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- 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 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.

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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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Promoting Excellence in Ultrasound

2/181 High Street, Willoughby
Sydney NSW 2068 Australia
Telephone: +61 2 9958 7655
Facsimile: +61 2 9958 8002
Email: asum@asum.com.au
Wesite: www.asum.com.au

Australasian Society for Ultrasound in Medicine (ASU

MEETING SECRETARIAT
ASUM 2005
C/- ICMS Pty Ltd
84 Queensbridge Street
Southbank VIC 3006
AUSTRALIA
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Facsimile: +61 3 9682 0288
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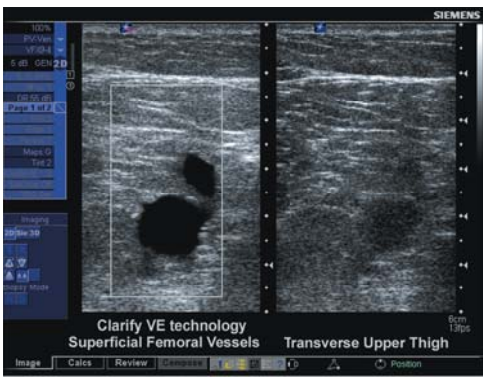

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