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Australasian Society for Ultrasound in Medicine

ULTRASOUND BULLETIN



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ULTRASOUND BULLETIN

Official publication of the Australasian Society for Ultrasound in Medicine

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Original research, case reports, quiz cases, short articles, meeting reports and calendar information are invited. Please send to the Editor of ASUM

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The Bulletin is published quarterly.

Opinions expressed should not be taken as those of the Australasian Society for Ultrasound in Medicine unless specifically indicated.

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Dear Readers

The Editorial staff extend congratulations to the executive team at ASUM who devoted enormous amounts of time and effort in mounting a successful WFUMB 2009 Sydney bid. The CEO's column has more details. Well done! This conference will provide one focus for ASUM for the next 6 years.

Readers, as always, are encouraged to peruse and digest the excellent scientific articles contained in this issue of the Bulletin. Dr Ying and others have provided a superb overview of imaging of the cervical lymph nodes. A complimentary paper follows on Ultrasound of the salivary glands. Wong and others have provided a comprehensive and erudite overview of this topic. These articles will enhance the understanding and performance of all readers who undertake or report examinations of the head and neck. A wonderful list of references is included with each article, to facilitate further in-depth understanding of these topics. A local author, Dr Gounden has contributed a very useful summary of a sometimes problematic obstetric ultrasound finding, the presence of a single umbilical artery. Safety in Ultrasound remains a 'hot topic' covered by ASUM councillor Stan Barnett. Dr Barnett has also compiled a key document on live scanning. Readers are encouraged to 'have your say' on this issue. Some further example worksheets have been included in this issue. Three worksheets included in the previous issue have stimulated a response from Dr Teele to the editor, published in this issue. Further comments and suggestions are welcomed. A survey on the use of worksheets is also included with this issue. All readers are urged to respond to this and distribute to colleagues. Stimulating book reviews and a WUFMB pictorial wrap up this issue.

Enjoy

**Dr Roger Davies
Editor**

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President's message



Dr Glenn McNally

My message in this Bulletin is very brief as much of the news that I wanted to convey is contained in the Annual Report.

The usual excellent array of articles has been gathered by Roger Davies and Keith Henderson. On the current developments front there has been considerable activities in the recent time in developing

educational strategies for clinicians involved in the performance of self referred ultrasound examination. We have met on several occasions with representatives of the Australasian College for Emergency Medicine and the Royal Australasian College of Surgeons. We hope sometime in the next three to six months to have established a modular

program of education resources for such clinicians and in doing so promote the best standard of ultrasound practice for patients in Australia and New Zealand.

I would like to congratulate Dr George Kossoff for being made WFUMB Life member and also being recently awarded the Prime Minister's Centenary Medal for service to "Australian society in ultrasonics in medicine."

As this issue was going to print I learnt of the death of Dr Brian Pridmore. Brian contributed much to ASUM and its South Australian branch. This will be acknowledged more comprehensively in the next issue.

I look forward to seeing many of you at ASUM 2003 Annual Scientific Meeting.

Dr Glenn McNally
President

From the desk of the CEO, Dr Caroline Hong



Dr Caroline Hong

It was a whirlwind trip with a mission. There was much to do in a very short time in Montreal for the ASUM bidding team. Many of you would have read the news release on the ASUM website notice board as well as the email newsletter (for those who have provided ASUM with their email addresses) the SUPER GREAT NEWS that ASUM won the bid to host the World

Congress of WFUMB in 2009 in Sydney! The EFSUMB bidding team also put up a good bid. ASUM is obviously exhilarated with the result and is humbled by the process.

Much of the efforts and activities in the bidding process have involved Dr Stan Barnett, Dr Glenn McNally and I over the last 2 years, with support and approval by the ASUM Council. It is indeed pleasing to see the fruits of our labour after a somewhat long and complex process.

We also conducted several ASUM business meetings on our way to Montreal to attend the WFUMB 2003 Congress. On 27 May 2003, Dr Stan Barnett and I had the opportunity to meet with Peter Sharpe, President and Marie Dunn, CEO of the British Institute of Radiology during our stopover in London on our way to Montreal. We also had the opportunity to briefly visit the BMUS office which is housed on the top level in the BIR building.

In Montreal, the WFUMB 2003 Congress was hosted by the AIUM. There were many opportunities to put faces to names of the many people I have communicated with by email about ASUM business. It was a great pleasure to meet Dr Carmine Valente, the CEO of AIUM and exchange association news and information about our societies at opposite ends of the globe. It was also great to meet and talk to all the WFUMB Councillors, many of whom I had met

previously when they conducted their site inspection in Sydney in February 2003. It was good to experience and see AIUM in action in hosting a WFUMB congress. The experience certainly will help prepare us for what to expect when WFUMB 2009 comes to Sydney. It was also fantastic to see so many Australians and New Zealanders visit the ASUM exhibition booth.

Dr Glenn McNally, Dr Stan Barnett and I also met with representatives of BMUS, Jane Bates, Dr David Pilling and Dr Kevin Martin about the potential for ASUM and BMUS working together for an exchange Sonographer Travelling Fellowship, over a period of 2-3 months, for an approved project. Dr Musarrat Hassan, past President of the Ultrasound Society of Pakistan also met with Dr Glenn McNally and me about society and education matters. Several of the ASUM representatives also had opportunities to enjoy the hospitality of Zonare, GE and Philips. We also attended the AIUM/WFUMB leadership reception at the Montreal City Hall and attended the AIUM/WFUMB banquet which was held at the Sheraton Hotel in Montreal. We appreciate the hospitality shown to us by AIUM and WFUMB.

The History of Medical Ultrasound session was interesting and it was also a great opportunity to meet many of the people who had contributed in the early years of medical ultrasound. A CD on the History was distributed to all delegates who attended the Congress. It was intended that this CD be updated at each congress and would certainly serve as a good historical record for medical ultrasound.

I have more news at a professional level. I have been admitted as a Fellow of the Australian Society of Association Executives through an accreditation process. That means I can use FSAE as postnominals after my name. It also means peer recognition in the association management field. The ASUM Council has also kindly approved for me and the

Cont'd on page 4



PERTH • WESTERN AUSTRALIA

4-7 September 2003

ASUM 2003

INTERNATIONAL KEYNOTE SPEAKERS

Dr Anil Ahuja, MD
 Professor, Department of Diagnostic Radiology and Organ Imaging
 The Prince Wales Hospital, Shatin, New Territories, Hong Kong
Area of Expertise - Head and Neck Ultrasound

Mr Timothy Hartshorne
 Department of Surgery, Leicester Royal Infirmary
 Leicester, UK
Area of Expertise - Vascular Ultrasound

Dr Wolfgang Holzgreve
 Chair, Department of Obstetrics and Gynaecology
 University of Basel, Switzerland
Area of Expertise - Obstetrics & Gynaecology Ultrasound

Dr Thomas Stavros, MD
 Craig Hospital, Englewood, Colorado, USA
Area of Expertise - Breast, Vascular and small parts Ultrasound

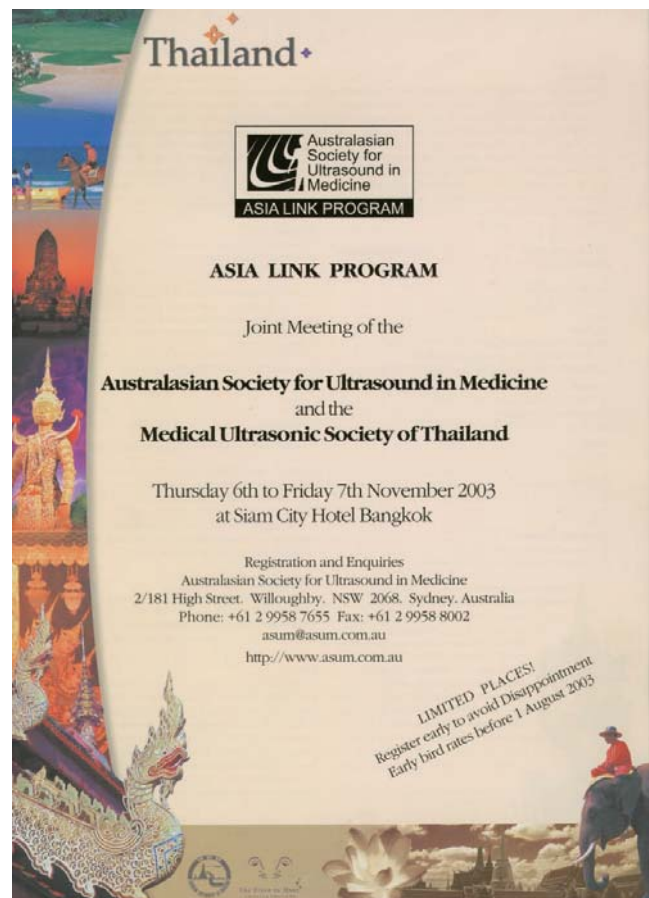
Professor Seung Hyup Kim
 Seoul National University Hospital, Korea
Area of Expertise - Imaging and nonvascular intervention of the genitourinary tract

IMPORTANT DATES

Abstract Deadline	Friday 30 May 2003
Early Registration Deadline	Friday 13 June 2003
Abstract Notification	Friday 18 July 2003
Accommodation Booking Deadline	Thursday 31 July 2003

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Thailand+

Australasian Society for Ultrasound in Medicine
ASIA LINK PROGRAM

ASIA LINK PROGRAM

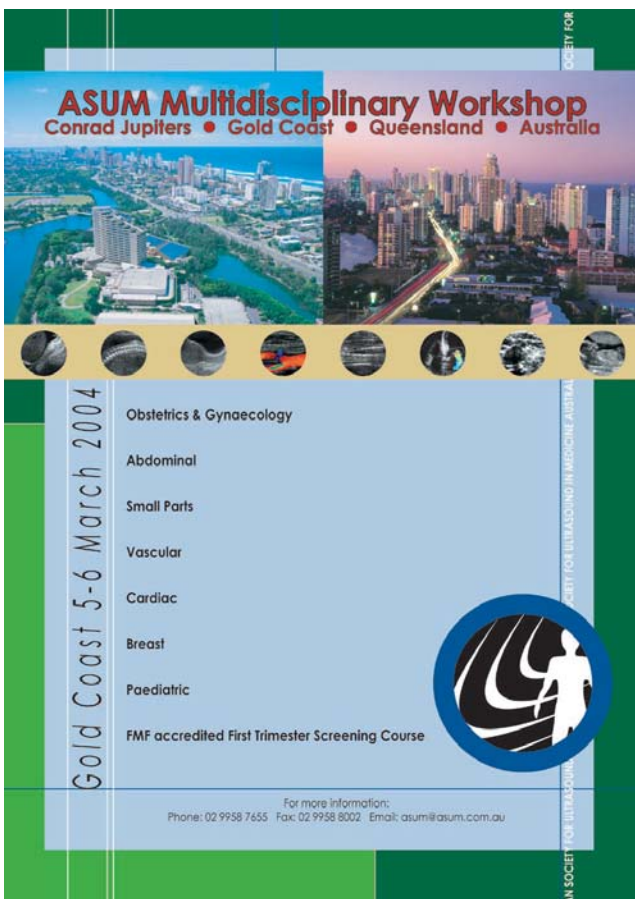
Joint Meeting of the

Australasian Society for Ultrasound in Medicine
 and the
Medical Ultrasonic Society of Thailand

Thursday 6th to Friday 7th November 2003
 at Siam City Hotel Bangkok

Registration and Enquiries
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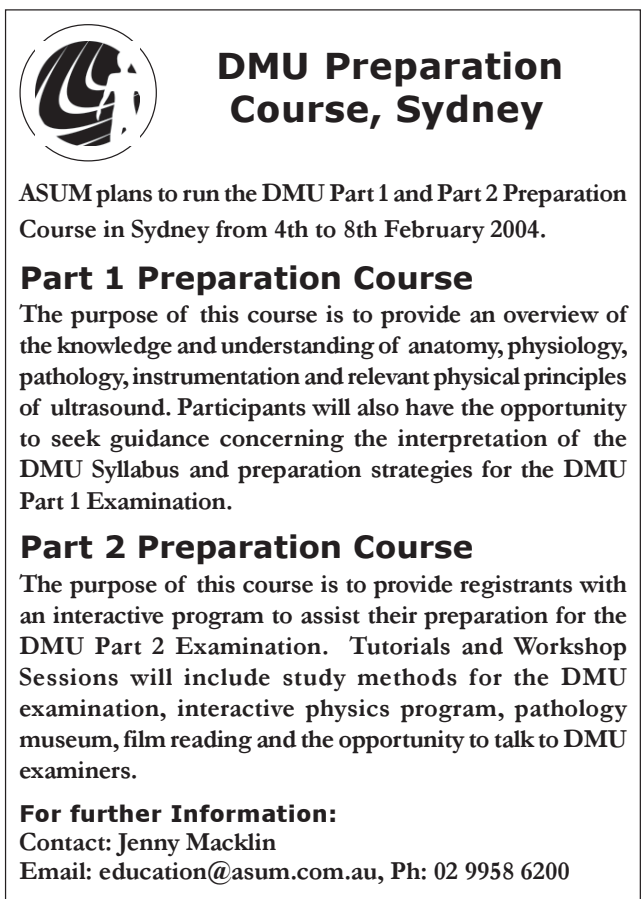
Gold Coast 5-6 March 2004

- Obstetrics & Gynaecology
- Abdominal
- Small Parts
- Vascular
- Cardiac
- Breast
- Paediatric

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For more information:
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AN SOCIETY FOR ULTRASOUND IN MEDICINE AUSTRALIA



DMU Preparation Course, Sydney

ASUM plans to run the DMU Part 1 and Part 2 Preparation Course in Sydney from 4th to 8th February 2004.

Part 1 Preparation Course

The purpose of this course is to provide an overview of the knowledge and understanding of anatomy, physiology, pathology, instrumentation and relevant physical principles of ultrasound. Participants will also have the opportunity to seek guidance concerning the interpretation of the DMU Syllabus and preparation strategies for the DMU Part 1 Examination.

Part 2 Preparation Course

The purpose of this course is to provide registrants with an interactive program to assist their preparation for the DMU Part 2 Examination. Tutorials and Workshop Sessions will include study methods for the DMU examination, interactive physics program, pathology museum, film reading and the opportunity to talk to DMU examiners.

For further Information:
 Contact: Jenny Macklin
 Email: education@asum.com.au, Ph: 02 9958 6200

Letter to the Editor

Dear Roger and editorial crew of the Ultrasound Bulletin

The article on thyroid ultrasonography is very good - congrats to the authors and to the publishers who did such a good job with the images.

You mentioned that you were putting draft worksheets out for comment. I think that worksheets are very helpful, especially in teaching institutions where there are frequently new trainees, registrars, etc.

I can't comment as can my adult colleagues on the vascular worksheets except that I think that the two views of the leg should be labelled as anteroposterior and lateral, if both are to be used. In fact, I would favor one schematic even if it is not quite anatomically correct - simpler, and less confusing. And I would leave more room for comments, including assessment of difficulty of examination or certainty of diagnosis. (eg 90 year old diabetic with edematous legs, vs young female radiologist with legs suitable for a stocking advertisement!)

Because I am involved in pediatric work, I would encourage the inclusion on the worksheet of the age of the patient - or birthdate, as study date is listed. Even in adult work, it is helpful to know the age of the patient. If there are multi-institutional studies, age of the patient is critical. (This

comment would also apply to any other worksheets, such as the vascular ones.)

Also, there is no inclusion of information regarding the collecting system, nor vascular supply. I'm not a great advocate of measuring everything, but there might be some space for measurement of transverse pelvic diameter (sometimes helpful in pediatrics and in pregnant mothers) and for a comment re calyces and ureters.

In terms of the vascular supply and drainage—it is not a routine part of a renal exam, but might be starred as a consideration when the clinical history is unusual. In pediatrics, we would look at renal vasculature in premature infants with aortic catheters and hypertension, with hematuria, etc. I'll leave it to the adults to make a list.

There is a great push in many areas of clinical research to have multi-institutional data and I believe that a simple, but comprehensive worksheet can be very helpful in making sure that data collection is uniform and complete between institutions. In addition, worksheets like this can be adapted for the final report, particularly on PACS where the sheet can be scanned.

Best Regards

Rita Teele

Editor's reply

Dr Teele has offered some important additions and modifications to any ultrasound worksheet.

The date of birth is important in many instances and should be included if not immediately available as an image overlay from the PACS reporting station. Standardized worksheets would certainly aid any multi-campus audit or research

project involving collection of ultrasound data. Paediatric worksheets should always be matched specifically to the different pathology and type of examination being conducted.

Thanks Dr Teele.

Roger Davies

Cont'd from page 2

President to attend the Australian Institute of Company Directors Diploma course. Council also resolved for every President Elect to attend and complete the Australian Institute of Company Directors Diploma course before becoming President. It was felt that this investment in its people will have immense benefit for ASUM immediately and in the long term.

Quality systems are always high on the agenda in the health care system. Similarly, quality management systems are important in the management of an organization. The ASUM Council, at its meeting in May 2003, resolved that ASUM should pursue accreditation towards the ISO

9001:2000 Australia standard. We are currently investigating this process.

Registrations are rolling in quickly for the ASUM 2003 Annual Scientific Meeting. I hope to see as many members attend the ASUM 2003 meeting in Perth and certainly also hope to see many Australians in Bangkok at our first ASUM Asia Link Program with MUST in November 2003.

Dr Caroline Hong
Chief Executive Officer

BDS (Uni Adel) GDHA (SA) AFCHSE CHE MHA (Uni NSW) FADI FSAE
carolinehong@asum.com.au

Updated program for ASUM 2003

This update of the provisional program published in the Registration Brochure incorporates changes made up until 25 June. It is possible that other changes will be required as unforeseeable circumstances may affect the availability of

some speakers. The Organising Committee makes every effort to ensure that such changes do not affect the quality or balance of the program.

THURSDAY 4TH SEPTEMBER, 2003

SKILLS DEVELOPMENT DAY PROGRAM

09:30 – 10:30	11:00 – 12:00	13:00 – 14:00	14:30 – 15:30
Arterial Legs and Endoluminal Stents Mr Tim Hartshorne	Carotid Duplex – live scanning Mr Doug O'Reilly	Venous Incompetancies Mr Tim Hartshorne	Ergonomics
Ultrasound of the Neck Prof Anil Ahuja	Advanced Breast Dr Tom Stavros	Shoulder Ultrasound Mr Les Rickman	Groin & Testes Dr Tom Stavros
The Complicated Pregnancy Mrs Rae Roberts	Fetal Heart Mrs Joan Sharp	The Female Pelvis Mrs Dawn Voges	Paediatric Hip & Head Dr Sven Thonell

11-14 WEEK SCAN THEORETICAL COURSE

08:30 - 10:30	11:00 - 12:30	13:30 - 15:00	15:30 - 17:00
Introduction and MCQ Ms Ann Robertson	Practicalities of measuring NT Mrs Dawn Voges	Counselling & Practical Issues Mrs Rosanne Stock	Increased Nuchal Translucency & normal karyotype Dr Bev Hewitt
NT & Chromosome Abnormalities Dr Bev Hewitt	12 Week anomaly scan Dr Bev Hewitt	Second Trimester Ultrasound Markers Dr Joanne Ludlow	MCQ Ms Ann Robertson
Principles of screening Dr Peter O'Leary	Multiple Pregnancy Prof Jan Dickinson	· Invasive Tests CVS / Amnio · Management of high risk patient · When to refer Dr Craig Pennell	Discussion Time and Questions Panel
Biochemical Screening / Sequential Screening Dr Narelle Hadlow			

Shoulders – With the increased availability of digital high definition ultrasound machines, there is an every increasing demand for performing ultrasound examinations of the shoulder, whether it be related to trauma, tendinopathy, soft tissue masses or arthritic disorders. This workshop will present an overview of skills required to perform rotator cuff and non-rotator cuff examinations of the shoulder joint. Anatomy and ultrasound techniques will be demonstrated.

Advanced Breast – Indications for breast ultrasound scanning including indications for Doppler studies and vofalremitus. Brief anatomical information and pathology including the appearance of common benign conditions. Scanner Setup – Scanning techniques including techniques for differentiating cystic from solid lesions. Identification of carcinoma problems and pitfalls including normal variants that mimic disease. Demonstrate ultrasound guided biopsy techniques including ultrasound guided fine needle aspiration, core biopsy and mamotome turkey phantom biopsy.

Arterial Legs & Endoluminal Stents - The indications for scanning and where duplex fits into the investigation process and management of the patient. Brief anatomical information and pathology, including different levels of disease such as diabetic runoff. Scanner setup. Scanning techniques, including ways of imaging the aortoiliac segment, approaches to imaging calf arteries and imaging vessels in obese patients. Grading of stenoses and categorising occlusions, i.e. acute on chronic, thrombotic or longstanding. Problems and pitfalls. Other pathologies, including imaging for popliteal aneurysms and popliteal entrapment syndrome. Reporting of results and likely outcomes.

Indications for stenting and different types of stents, ie stents for endovascular aortic aneurysm repair, aortoiliac stenting and stenting below the iliac arteries. Scanner setup. Scanning techniques. Categorising the 5 types of endoleaks in endovascular abdominal aortic aneurysm (AAA) repair. Detecting endoleaks. Assessing flow in iliac stents and investigating instent stenosis, including hyperplasia. Problems and pitfalls. Reporting of results and follow up investigations.

Meet the Experts over Brunch

An innovation at this year's Annual Scientific Meeting is the opportunity for small-group discussion with our visiting experts. Enjoy Sunday morning at ASUM 2003 by having an interactive brunch with our conference Experts. Over the aroma of brewed coffee and croissants discuss issues with recognised experts in their field. Find the answers to the questions you

always wanted to ask, but never had the opportunity to. Tables of ten will be allocated based on your nomination. Experts include Anil Ahuja (neck), Seung Hyup Kim (Genito-urinary tract), Wolfgang Holzgreve (obstetrics and gynaecology), Sven Thonell (paediatrics), Fiona Bettenay (breast, medico-legal), Tim Hartshorne (vascular), Tom Stavros (small parts, breast).

SCIENTIFIC PROGRAM**FRIDAY 5TH SEPTEMBER 2003****Plenary Session**

0900 Welcome – Dr Jan Dickinson, Convenor

0910 Dr Geoff Gallop, Premier of WA

0930 Prof Wolfgang Holzgreve – Fetal cells and DNA as predictors for fetal and maternal diseases. Could it replace ultrasound eventually?

1000 Dr Tom Stavros – Advances in breast ultrasound

1030 *Morning Tea - Exhibition Hall*

Concurrent Sessions

	<u>O&G</u>	<u>Breast</u>	<u>Vascular</u>
1100	Mrs Joan Sharpe Fetal cardiac imaging: improving your view	Dr Tom Stavros Percutaneous breast biopsy	Mr Tim Hartshorne The role of the vascular lab in the management of patients suffering from vascular diseases.
1130	Dr Luigi D'Orsogna Fetal cardiac anomalies:	Ms Carol Bishop A consumer's prespective of breast cancer imaging	Dr Con Phatouros Cerebral Hyper-perfusion Syndrome
1150	Andrew Bullock Management and outcomes of congenital cardiac defects	Ms Donna Ramsay Breast Anatomy Redefined by Ultrasound in the Lactating Breast	Dr Kishore Sieunarine AV fistulas
1210	Dr Craig Pennell Fetal cardiac arrhythmias	Ms June Councillor Barriers to Breast Imaging for Indigenous Women	Dr John Fraser Improve your Waveform Surfing

1230 *Lunch - Exhibition Hall*

Plenary Session - Asia Link

1330 Dr Stan Barnett – Chair of session

1335 Prof Anil Ahuja “Imaging of the Salivary Glands”

1355 Prof Seung Hyup Kim “Doppler ultrasound of the kidney”

1415 Prof Hiroki Watanabe “WFUMB Lecture - Accreditation for ultrasound in the world”

1435 Prof Kanu Bala “Ultrasound education in Bangladesh”

1555 Questions

1500 *Afternoon Tea - Exhibition Hall*

Concurrent Sessions

	<u>Musculoskeletal</u>	<u>Medicolegal</u>	<u>Men's Health</u>
15:30	Dr Bill Braidahl Ultrasound of Peripheral Nerve Pathology Susan Farman Ultrasound Diagnosis in Chronic Ankle Pain Julie Gregg Plantar Plate of the Lesser Metatarsals: Ultrasound Imaging vs MRI Dr Ken Maguire Sports Medicine Injuries Mr Simon Bowman The groin - injuries and management	Miss Carol Barden Insurance for Sonographers Dr Fiona Bettenay Medico-legal Issues for Radiologists Mrs Deborah Williams Lawyer's Viewpoint Discussion	Dr Tom Stavros Image and Doppler findings in Evaluation of Scrotal Pain Professor Seung Hyup Kim Erectile Dysfunction: evaluation with Doppler ultrasound Dr Jim Anderson Transrectal Ultrasound of the Prostate: the Patient's and the Pathologists Perspective Mr Neville Philips Ultrasound Assessment of the Potentially Infertile Male

1800 *Welcome Reception - Burswood Resort Casino – Conference foyer or Ruby Room*

SATURDAY 6TH SEPTEMBER 2003**Plenary Session**

0900 Professor John Newnham - Prenatal Ultrasound Exposure in Childhood Outcomes

0930 Professor Wolfgang Holzgreve – Experiences in an Ultrasound and Biochemistry First Trimester Screening Program

1000 Mr Tim Hartshorne – The Correlation of Ultrasound and Surgical Findings in Vascular Disease

1030 *Morning Tea - Exhibition Hall*



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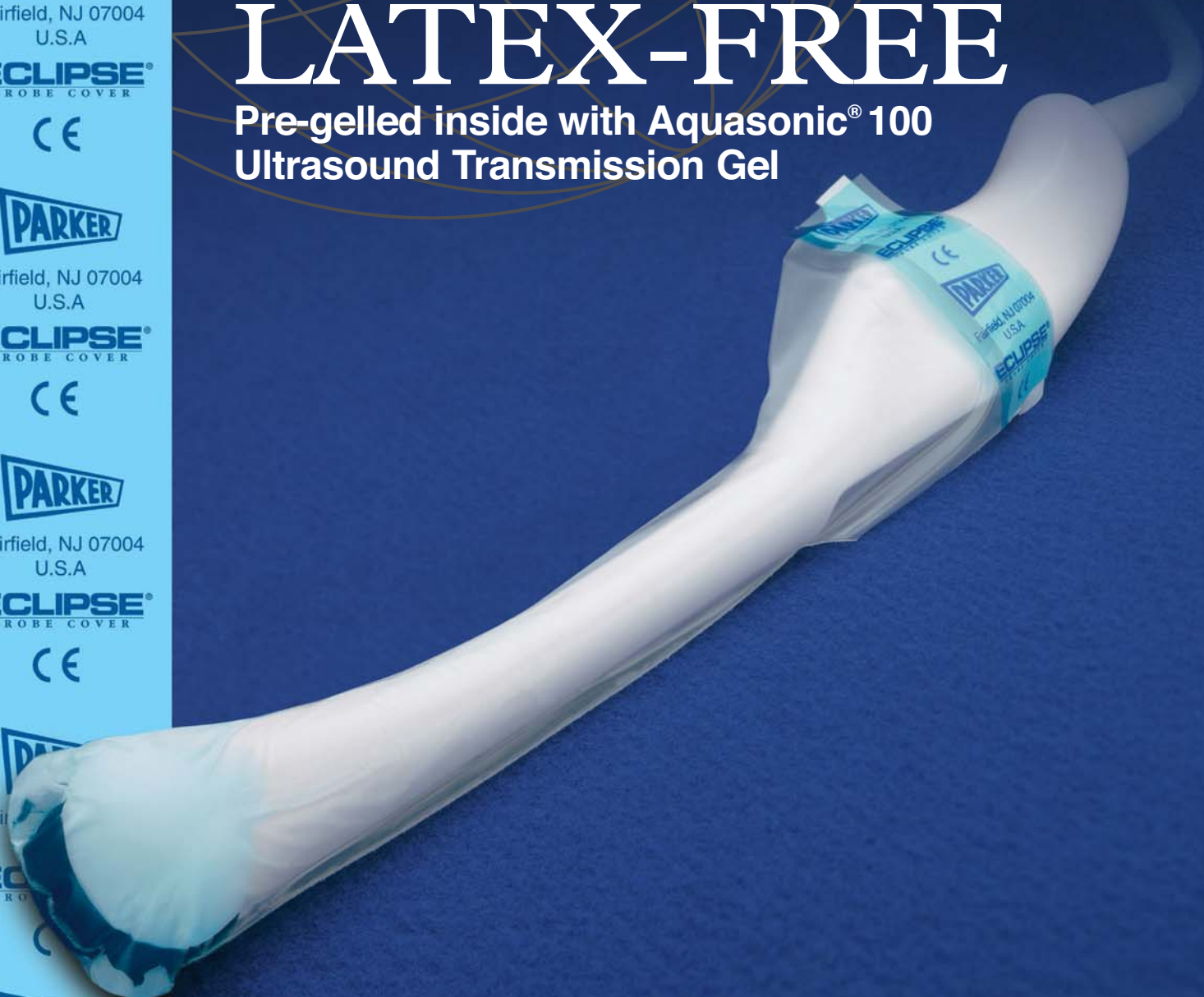
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Concurrent Sessions

1100	<p><u>New Investigators</u></p> <p>Dr Dave Rogers ASUM Online Handbook</p> <p>Mrs Margo Gill Prospective evaluation of a First Trimester Screening Program for Down Syndrome and Other Chromosomal Abnormalities Using Maternal Age, Nuchal Translucency and Biochemistry in an Australian Population</p> <p>Dr Kristy Milward Uterine arteriovenous Malformations</p> <p>Mrs Lorilli Jacobs An Ultrasound Study of Nipple Position in Term Infant Breastfeeding</p> <p>Mrs Rae Roberts + Dr Tamara Walters Ultrasound of Implanon (a lost contraceptive device in the arm)</p>	<p><u>General</u></p> <p>Prof Anil Ahuja Sonography of Thyroid Nodules</p> <p>Dr Richard Price Imaging of the Fat Infiltrated Liver</p> <p>Dr Richard Mendelson The Role of Ultrasound in the Acute Abdomen</p> <p>Dr Martin Marshall Assessment of the Abdominal Aortic Aneurysms Post Endoluminal Repair</p>	<p><u>Women's Health</u></p> <p>Dr Joanne Ludlow Ovarian Ultrasound</p> <p>Dr Yee Leung Adnexal Masses</p> <p>Dr Bev Hewitt Assessment of the Endometrium</p> <p>Dr Roger Hart Endometrial management</p>
1330	<p><u>Perinatal</u></p> <p>Prof Wolfgang Holzgreve Ultrasound Assessment of the Cervix in Preterm Delivery Prediction</p> <p>Mrs Karen Reid + Dr Ian Gollow Fetal Gastroschisis</p> <p>Dr Bev Hewitt + Dr Andrew Barker Obstructive Renal Disorders</p> <p>Mrs Margo Gill Sydney Ultrasound for Women Initial Experience with Fetal nasal Bone Assessment in the First Trimester</p> <p>Ms Ann Quinton Diagnosing an Atrio-Ventricular Septal Defect in the Fetus</p>	<p><u>Paediatrics</u></p> <p>Dr Sven Thonell Ultrasound Assessment of Postnatal Brain Development</p> <p>Dr Sven Thonell Imaging of Abdominal Pain in Children</p> <p>Dr Fiona Bettenay Errors of Interpretation in Renal Ultrasound</p> <p>Dr Ros Thomson Paediatric Abdominal Masses</p>	<p><u>General</u></p> <p>Dr Roger Davies Ultrasound Applications in Intervention</p> <p>Dr Karin Margolius Application of Radiology to Forensic Investigation</p> <p>Dr Michelle Atherton Ultrasound in Stress Urinary Incontinence</p> <p>Dr Hans Peter Dietz 3D Volume Ultrasound of Suburethral Slings</p> <p>Ms Tricia Mares The Value of Resistive Index Measurement in the Prediction of Clinical Outcome following Stenting for Renal Artery Stenosis</p>
1530	<p><u>Musculoskeletal</u></p> <p>Dr Bill Breidahl Sonography of the Finger</p> <p>Dr Jeff Ecker Ultrasound Imaging of the Upper Extremity</p> <p>Dr Frederick Joshua + Mr Rohan de-Carle Power Doppler Signal Reduction after the Application of Transducer Pressure to the Metacarpopharyngeal Joints of Rheumatoid Arthritis Patients</p> <p>Dr Keith Holt Imaging of Orthopaedic Problems</p>	<p><u>Breast</u></p> <p>Dr Tom Stavros Solid Breast Nodules: benign or malignant</p> <p>Dr Roslyn Adamson The National Breast Cancer Centre Breast Imaging Guidelines and Overview</p> <p>Dr Liz Wylie Breast Ultrasound of Radial Scars</p> <p>Dr Fiona Bettenay The Role of Ultrasounds in the Dense Breast</p>	<p><u>Developments</u></p> <p>Dr Jim Anderson Ultrasound in the Assessment of Fistula-In Ano</p> <p>Dr Duncan Ramsay Endoscopic Ultrasound</p> <p>Dr Connor Murray Ultrasound of the Vermiform Appendix</p> <p>Mr Peter Coombs The Effect of Secondary Maternal Hypertension on the Fetal Rabbit: Ultrasound Assessment of Growth</p> <p>Mrs Louise Hollier An evaluation of colour to capsule distance in the detection of chronic allograft nephropathy</p>

SUNDAY 7TH SEPTEMBER 2003

0900	<p>Dr Neil Macpherson "The role of ultrasonography in the identification of appendicitis: a pro-forma"</p> <p>John Fletcher "Colour doppler in the diagnosis of popliteal vascular entrapment"</p> <p>Margo Gill "Hysterosalpingo-Contrast-Sonography (HyCoSy): The Sydney Ultrasound for Women experience"</p> <p>Dr Suhanna Abdul-Hamid "Ultrasound diagnosis of adenomyosis"</p>
1000	<p>Meet the Experts over brunch</p>

Ultrasound evaluation of neck lymph nodes

Michael Ying PhD; *Anil Ahuja FRCR; Fiona Brook PhD; *KT Wong FRCR

Department of Optometry and Radiography, The Hong Kong Polytechnic University, Hung Hom, Kowloon, Hong Kong SAR, China

*Department of Diagnostic Radiology & Organ Imaging, Prince of Wales Hospital, Shatin, New Territories, Hong Kong SAR, China

ABSTRACT

Ultrasound is a useful imaging modality in the assessment of cervical lymph nodes. Grey scale sonography helps to evaluate the morphology of cervical nodes, whereas power Doppler sonography can be used to assess the vasculature of lymph nodes. The grey scale sonographic features that help distinguish the various causes of cervical lymphadenopathy include their size, shape, internal architecture, and distribution; the presence of intranodal necrosis, an echogenic hilus or calcification. The presence of adjacent soft tissue edema and matting of nodes are useful features to identify tuberculous lymphadenitis. In power Doppler sonography, vascular pattern of the lymph nodes is more useful than vascular resistance in differentiating benign from malignant cervical nodes.

A good understanding of the normal lymph node anatomy, scanning equipment required and the scanning technique is essential before pathology assessment should be commenced.

This article reviews these topics to provide an overview for sonography of cervical lymphadenopathy.

Keywords: Ultrasound, grey scale, Doppler, cervical lymph nodes, normal, abnormal

INTRODUCTION

Evaluation of cervical lymphadenopathy is essential for patients with head and neck carcinomas because it helps in the assessment of prognosis and the selection of treatment^{1,2}. In patients with head and neck carcinomas, the presence of a metastatic node on one side of the neck reduces the 5-year survival rate by 50%, whilst the presence of a metastatic node on both sides reduces the 5-year survival rate to 25 %³. Metastatic neck nodes from head and neck carcinomas are site specific. It has been reported that metastatic nodes in an unexpected site indicates that the primary tumour is more biologically aggressive⁴.

The head and neck region is a common site of involvement for lymphoma compared to other parts of the body, and the cervical lymph nodes are most commonly involved⁵. Lymphoma of cervical lymph nodes is often difficult to differentiate from other metastatic cervical lymph nodes clinically. As the treatment for lymphoma and metastases is different, accurate differential diagnosis between the two conditions is essential.

Tuberculous lymphadenitis is a common disease in South East Asia. However, with the increasing prevalence of acquired immune deficiency syndrome (AIDS) and an associated increase in tuberculous lymphadenitis^{6,7}, the incidence of tuberculous lymphadenitis is increasing worldwide, and thus the need for early accurate diagnosis.

Ultrasound plays an important role in the evaluation of cervical lymph nodes because of its high sensitivity and specificity when combined with fine-needle aspiration

cytology (FNAC) (98% and 95% respectively)⁸. It has been reported that ultrasound is superior to clinical examination in the detection of cervical lymphadenopathy with a sensitivity of 96.8% and 73.3% respectively⁹. Ultrasound is more sensitive than computed tomography (CT) in the detection of small nodes. Lymph nodes less than 5 mm in diameter are difficult to detect with CT¹, whereas high resolution ultrasound can detect lymph nodes as small as 2 mm in diameter¹⁰. Neo-vascularization is commonly found in malignant lymph nodes^{2,11}, with this abnormal vascularity being different from that of normal lymph nodes. Power Doppler sonography has a high sensitivity in the detection of fine vessels. It provides additional information during sonographic examination of cervical nodes by indicating the presence/absence of vascularity, demonstrating the vascular distribution and estimating the vascular resistance of nodal vessels.

NORMAL ANATOMY

Cervical lymph nodes are located along the lymphatic channels of the neck. Each cervical lymph node has cortical and medullary regions, and is covered by a fibrous capsule^{12,13}.

The cortex consists of lymphocytes which are densely packed together to form spherical lymphoid follicles, whereas the medulla is composed of medullary trabeculae, medullary cords and medullary sinuses. The paracortex is an intermediate area between the cortex and the medulla, where the lymphocytes return to the lymphatic system from the blood circulation. In the medulla of the lymph node, the medullary trabeculae, composed of dense connective tissue similar to the capsule, act as a framework extending from the capsule and guides blood vessels and nerves to different regions of the lymph node. The medullary cords and medullary sinuses are composed of reticulum cells. The medullary cords contain mainly plasma cells and small lymphocytes, whilst the medullary sinuses are filled with lymph and are part of the sinus system of the lymph node^{12,13}.

Cervical lymph nodes contain blood vessels. The main artery enters the lymph node at the hilus, which then branches into arterioles. Some of the arterioles supply the capillary bed in the medulla and some of them run along the medullary trabeculae to the cortex where the arterioles further branch into capillaries and supply the lymphoid follicles. The rest of the arterioles run along the trabeculae and reach the capsule where they anastomose with other branches¹²⁻¹⁴.

The venous system has a similar route as the arterial system. The venules converge to form small veins in the cortex. The small veins run along the trabeculae of the lymph node and reach the medulla where they further converge to form the main vein. The main vein leaves the lymph node at the hilus¹²⁻¹⁴.

Ultrasound evaluation of neck lymph nodes

CLASSIFICATION OF LYMPH NODES

There are about 300 lymph nodes in the neck⁴. The American Joint Committee on Cancer (AJCC) classification was developed to provide a simple and efficient way to classify the cervical lymph nodes, and this classification is widely used by surgeons and oncologists. The AJCC classification divides palpable cervical lymph nodes into seven levels which are based on the extent and level of cervical nodal involvement by metastatic tumour¹⁵ (Figure 1).

Despite the common use of the AJCC classification in identifying the location of lymph nodes, some common sites of nodal metastases of head and neck tumours, such as the parotid and retropharyngeal nodes, are not included in this classification. Since the AJCC classification is used in

different imaging modalities such as computed tomography and magnetic resonance imaging, some lymph nodes in this classification may be difficult to be assessed by ultrasound, such as the paratracheal prelaryngeal, and upper mediastinal nodes.

In order to simplify the ultrasound examination of the neck and to ensure that all areas of the neck are covered in a systematic way, Hajek *et al.*¹⁶ developed another classification for ultrasound examination of the neck which is based on the location of the lymph nodes (Figure 2). However, one should note that this classification is used to facilitate the ultrasound examination of the neck and should not be used for staging of carcinomas which is based on the AJCC classification.

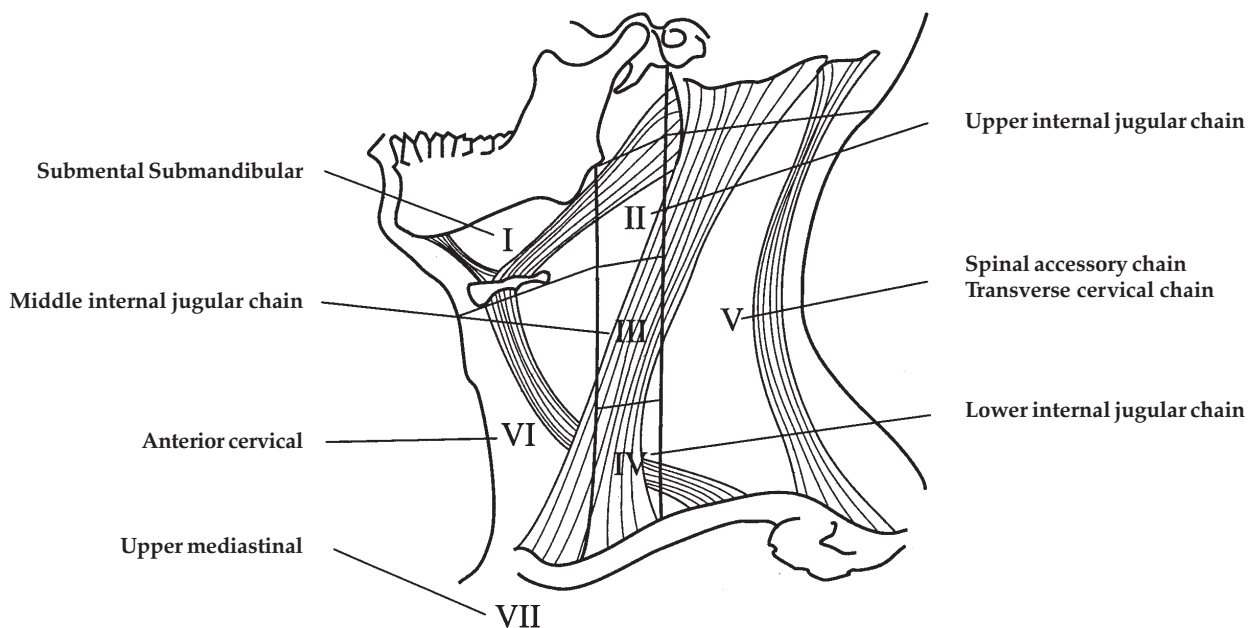


Figure 1 Schematic diagram of the neck showing the American Joint Committee on Cancer (AJCC) classification of cervical lymph nodes.

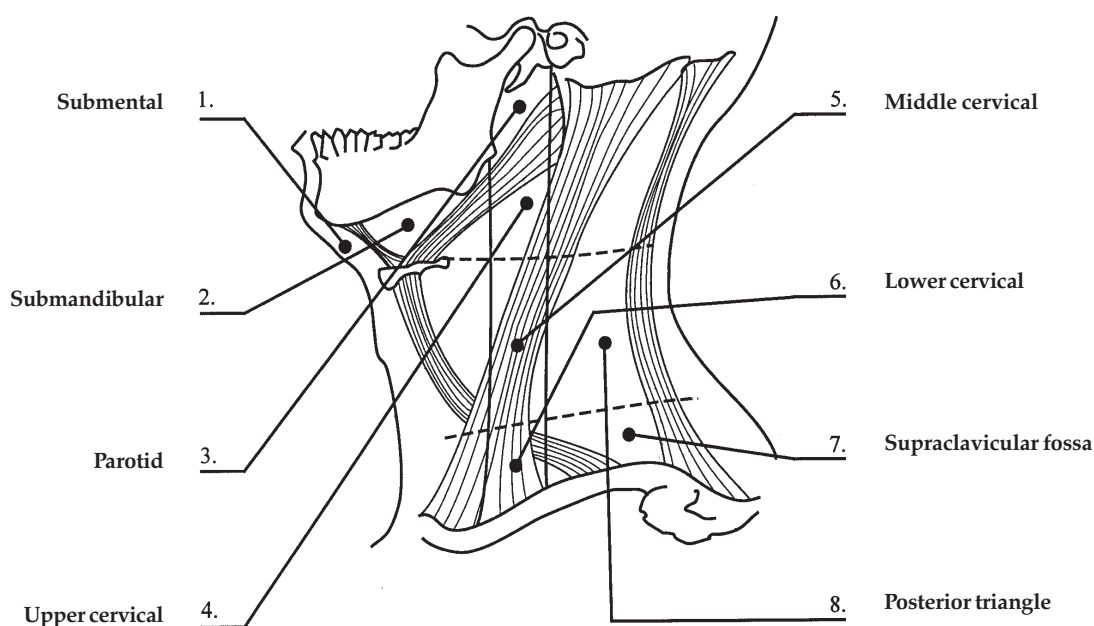


Figure 2 Schematic diagram of the neck showing the classification of the cervical lymph nodes to facilitate ultrasound examination.

EQUIPMENT AND SCANNING TECHNIQUE

For ultrasound examinations of the neck, a linear array 7.5 MHz transducer is the basic requirement. A transducer of higher frequency, e.g. 10 MHz, allows better resolution for the superficial structures, however, there is a trade-off with lower penetration. Recently, broadband transducers, eg 5 to 12 MHz, give higher resolution images and provide satisfactory penetration. For the assessment of deep lesions, a 5 MHz convex transducer or a 5 to 7 MHz broadband convex transducer is occasionally used. A standoff pad is useful in the assessment of large and superficial masses. Doppler units and applications are now standard on most of the commercially available ultrasound units, and power Doppler sonography (PDS) is desirable for the assessment of the vasculature of the small structures in the neck, such as lymph nodes, because of its high sensitivity in detecting small vessels. When PDS is used in the evaluation of the vasculature of cervical lymph nodes, the Doppler setting should be optimized for the detection of vessels with low blood flow:

- high sensitivity
- pulsed repetition frequency (PRF) = 700 Hz
- medium persistence
- low wall filter
- the colour gain is first increased to a level which shows colour noise, and then decreased until the noise just disappears

For ultrasound examination of cervical lymph nodes, the patient should lie supine on the examination couch with the shoulder supported by a pillow or triangular soft pad, and the neck hyperextended. The examination should begin with a transverse scan of the submental area. The transducer is then swept laterally to one side of the neck to the submandibular area, and the patient's head is turned away from the side under examination to allow free manipulation of the transducer. The submandibular area is examined with transverse scans along the inferior border of the mandibular body. As some of the submandibular nodes may reside behind the submandibular niche behind the body of the mandible, the transducer may need to be angled cranially to assess these lymph nodes. The transducer is then swept laterally and superiorly along the angle of the mandible, and the mandibular ramus towards the pre-auricular region to examine the parotid region. Transverse and longitudinal scans are used to examine the parotid nodes. The internal jugular chain nodes are divided into upper, middle and lower cervical nodes. They are examined with the transducer scanning transversely from the tail of the parotid gland to the junction between the internal jugular vein and the subclavian vein, and along the common carotid artery and internal jugular vein. The transducer is then moved laterally along the clavicle to the supraclavicular fossa, where the supraclavicular nodes are examined with transverse scans. A slight caudal angulation is required to avoid obscuring the lymph nodes by the clavicle. The posterior triangle nodes are examined with transverse scans from the mastoid tip to the acromion process along the imaginary course of spinal accessory nerve. Longitudinal scanning is occasionally used to assess the relationship between lymph nodes, especially when they may be matted.

When PDS is used to evaluate the vasculature of lymph nodes, it starts with adjusting the size of the colour box so that it is large enough to cover the whole lymph node. The Doppler settings are then optimized as described. The vascular pattern of the lymph node is assessed with the transducer slowly sweeping from one end of the node to another. The vascular pattern is classified into four categories, ie

- Hilar – flow signals branch radially from the hilus, regardless of whether the signals originate from the central area or from the periphery (Figure 3).
- Peripheral – flow signals along the periphery of the lymph node and have branches perforating the lymph node, which are not arising from the hilar vessels (Figure 4).
- Mixed – the presence of hilar and peripheral vessels (Figure 5).
- Apparent avascular – absence of flow signal.

Spectral Doppler is used to measure the vascular resistance (resistive index, RI; pulsatility index, PI) in the lymph node. The more prominent vessels are selected for the measurement, and the angle of insonification is varied to identify the prominent vessels. Measurements are obtained from the average value of three consecutive Doppler waveforms. The sample volume should be adjusted to the smallest value, e.g. 1 mm, and is placed in the centre of the

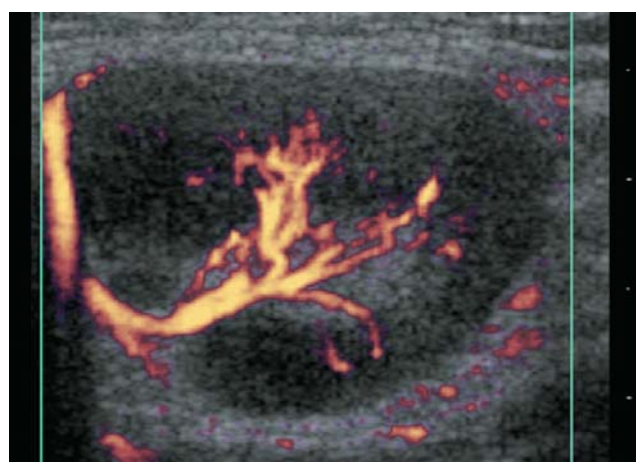


Figure 3 Power Doppler sonogram of a reactive lymph node showing hilar vascularity.

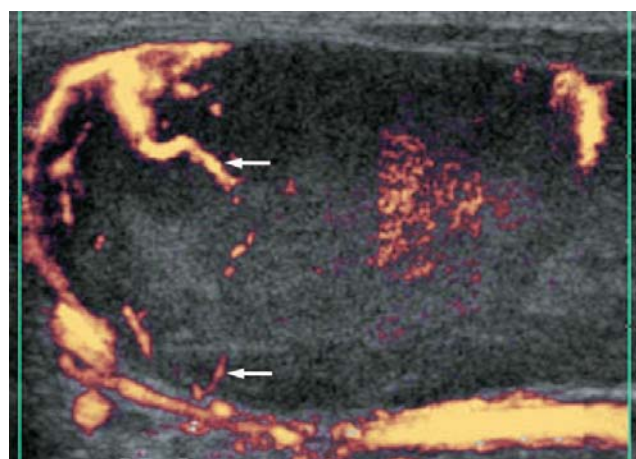


Figure 4 Power Doppler sonogram showing a malignant node with peripheral vascularity (arrows).



Figure 5 Power Doppler sonogram of a malignant node with both hilar (arrows) and peripheral (arrowhead) vascularity.

vessel. Angle correction should be made at 60° or less, if blood flow velocity (peak systolic velocity, PSV; end diastolic velocity, EDV) is to be measured. The Doppler gain is increased until background noise appears and then reduced until the noise is just suppressed. A low wall filter should be used and PRF is adjusted until the PSV and EDV can be measured and without aliasing.

SONOGRAPHIC FEATURES OF NORMAL AND ABNORMAL CERVICAL NODES

Distribution

Normal cervical lymph nodes are usually found in the submandibular, parotid, upper cervical and posterior triangle regions¹⁷. Metastatic nodes in head and neck cancers have a specific distribution, and this typical distribution helps with identifying neck metastases and tumour staging^{4, 18}. In patients with no known primary tumour, the distribution of metastatic nodes may give a clue to identify the primary. Moreover, cervical lymph nodes involved with non-Hodgkin's lymphoma and tuberculosis also have a specific distribution¹⁹⁻²¹. Table 1 summarizes the distribution of cervical lymph nodes in different metastatic head and neck carcinomas, non-Hodgkin's lymphoma and tuberculosis.

Table 1 Distribution of cervical lymphadenopathy in different diseases.

Diseases	Nodal group(s) commonly involved
Oropharynx, hypopharynx, larynx carcinomas	Internal Jugular chain
Oral cavity carcinomas	Submandibular Upper cervical
Infraclavicular carcinomas	Supraclavicular fossa Posterior triangle
Nasopharyngeal carcinoma	Upper cervical Posterior triangle
Papillary carcinoma of the thyroid	Internal jugular chain
Non-Hodgkin's lymphoma	Submandibular Upper cervical Posterior triangle
Tuberculosis	Supraclavicular fossa Posterior triangle

Size

Size has been used to differentiate reactive from malignant nodes¹⁶. Although larger nodes have a higher incidence of malignancy, reactive lymph nodes can be as large as malignant nodes. Moreover, metastases can be found in small lymph nodes²². In the literature, different cut-off values of nodal size have been reported (5mm, 8mm and 10mm)^{16, 22, 23}. As the cut-off points of nodal size increase, the sensitivity of the size criteria in differentiating reactive from malignant nodes decreases whilst the specificity increases²⁴. In our experience, size of lymph nodes cannot be used as the sole criterion in differential diagnosis. However, nodal size is useful in clinical practice when the size of lymph nodes in a patient with a known carcinoma increases on serial ultrasound examinations, and is highly suspicious for metastases. Moreover, progressive change of nodal size is useful to monitor the treatment response of the patients^{25, 26}.

Shape

Malignant lymph nodes (lymphoma and metastases) tend to be round with a short axis to long axis (S/L) ratio greater than 0.5 (Figure 6), whereas normal and reactive nodes are usually elliptical in shape with a S/L ratio less than 0.5 (Figure 7)^{2, 27-29}.

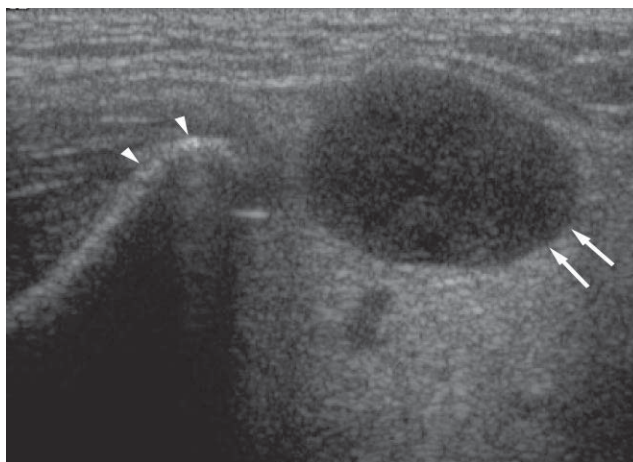


Figure 6 Longitudinal sonogram showing a round, hypoechoic malignant submandibular node without echogenic hilus (arrows). The arrowheads indicate the body of mandible.

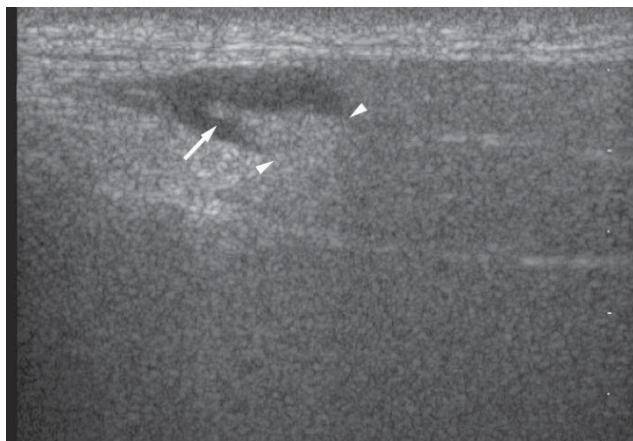


Figure 7 Longitudinal sonogram of an elliptical, hypoechoic normal parotid node with an echogenic hilus (arrow), which is continuous with the adjacent fat (arrowheads).

It has also been reported that tuberculous nodes are often round in shape^{20, 21}. Although pathologic nodes are usually round, normal submandibular and parotid nodes can also be round in shape (95% and 59% respectively)²⁹. Therefore, shape of lymph nodes cannot be the sole criterion in the diagnosis. Eccentric cortical hypertrophy is another useful feature in identifying malignant nodes, and it correlates with focal cortical tumour infiltration in the lymph node².

Echogenic hilus

The echogenic hilus is mainly the result of multiple medullary sinuses, each of which acts as an acoustic interface, which partially reflects the ultrasound waves and produces an echogenic structure, whilst fatty infiltration makes the hilus more obvious^{2, 30, 31}. On ultrasound, the echogenic hilus appears as an hyperechoic linear structure and is continuous with the adjacent fat (Figure 7)³⁰⁻³². In the normal neck, about 90% of nodes with a maximum transverse diameter greater than 5mm show an echogenic hilus³³, and the incidence of echogenic hilus within lymph nodes is higher in older people³⁴. The higher incidence of echogenic hilus is probably related to the increased fatty deposition in lymph nodes in the elderly. Malignant lymph nodes usually do not show echogenic hilus (Figure 6), and the presence of an echogenic hilus within lymph nodes was previously considered as a sign of benignity¹⁰. However, it has been reported that echogenic hilus may also be found in malignant nodes^{2, 18, 21, 31}, and small normal nodes may not show echogenic hilus³³. Therefore, the presence/absence of echogenic hilus should not be used as the sole criterion for evaluating cervical lymphadenopathy.

Nodal border

Malignant lymph nodes tend to have sharp borders, whilst normal lymph nodes usually show unsharp borders²³. Our previous study showed that normal lymph nodes in the upper neck (submental, submandibular, parotid and upper cervical regions) usually have unsharp borders, but normal posterior triangle nodes predominantly show sharp borders (70%)²⁹. An unsharp border is also found in tuberculous nodes, and is related to the associated edema and inflammation of surrounding soft tissue (periadenitis)^{18, 21}.

The sharp border in malignant nodes is due to the fact that tumour infiltration causes an increase in the difference in acoustic impedance between intranodal and surrounding tissues²³. However, malignant nodes in advanced stages may also show an ill-defined border, indicating extracapsular spread and it reduces the survival rate for 50%³⁵. In our experience, nodal border is not a reliable criterion in distinguishing normal from abnormal nodes in routine clinical practice. However, the presence of ill-defined borders in a proven metastatic node indicates extracapsular spread and is useful in predicting patient prognosis.

Echogenicity

Metastatic lymph nodes are predominantly hypoechoic when compared to the adjacent soft tissues^{18, 20, 21, 36}, except for metastatic nodes from papillary carcinoma of the thyroid which are commonly hyperechoic (Figure 8)³⁷. The hyperechogenicity of metastatic nodes in papillary carcinoma of the thyroid is probably related to the

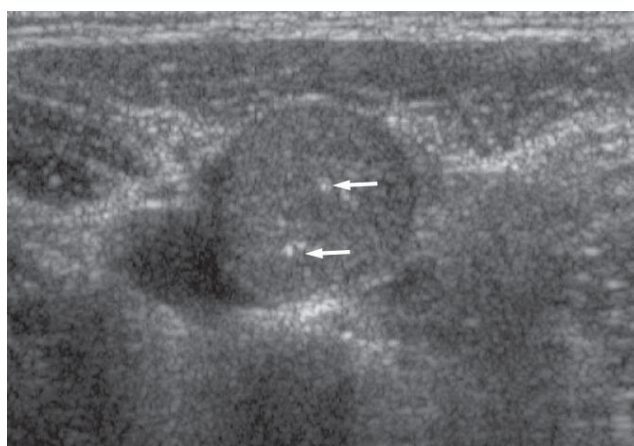


Figure 8 Transverse sonogram showing a metastatic node in papillary carcinoma of the thyroid, which is hyperechoic when compared to the adjacent muscle, and shows multiple, punctuate calcifications (arrows).

intranodal deposition of thyroglobulin, which is produced in the primary tumour³⁸. Therefore, when hyperechoic nodes are detected, radiologists should also examine the thyroid glands for any tumours.

Lymphomatous nodes were previously found to be hypoechoic with posterior enhancement, a pseudocystic appearance¹⁹. However, with the use of higher frequency transducers, e.g. 5 to 12 MHz broadband transducers, lymphomatous nodes demonstrate a micronodular echopattern (Figure 9)³⁹. Tuberculous nodes tend to be hypoechoic which is related to intranodal cystic necrosis^{20, 21}.

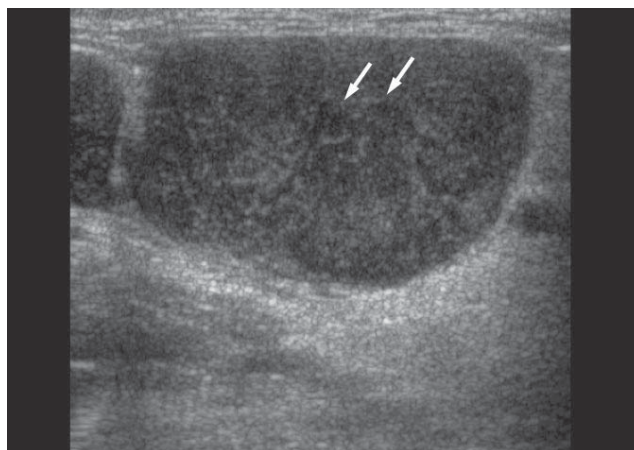


Figure 9 Sonogram with a high-resolution transducer showing a lymphomatous node with micronodular echopattern (arrows).

Calcification

Calcification within lymph nodes is uncommon, however, metastatic cervical nodes from medullary and papillary carcinoma of the thyroid tend to show calcification (Figure 8)^{4, 37, 38}. The calcification is usually punctuate, peripherally located and shows acoustic shadowing with a high resolution transducer. Although metastatic nodes from medullary and papillary carcinoma of the thyroid may both show calcification, the incidence is relatively lower in medullary carcinoma of the thyroid. In addition, the

Ultrasound evaluation of neck lymph nodes

echogenicity of the lymph nodes may help the differentiation, as metastatic nodes from medullary carcinoma of the thyroid are hypoechoic, whereas metastatic nodes from papillary carcinoma of the thyroid are hyperechoic. The relatively high incidence of calcification in metastatic nodes from papillary carcinoma of the thyroid makes this feature useful for the diagnosis.

Calcification may also be found in lymph nodes, including lymphomatous and tuberculous nodes, after treatment. However, the calcification in these nodes is usually dense and shows acoustic shadowing.

Intranodal necrosis

Lymph nodes with intranodal necrosis, regardless of their size, are pathologic⁴. Intranodal necrosis can be classified into two types: cystic necrosis (also known as liquefaction necrosis) and coagulation necrosis. Cystic necrosis appears as an echolucent area within the lymph nodes (Figure 10), whilst coagulation necrosis is an uncommon sign and appears as an echogenic focus within the nodes³⁰⁻³².

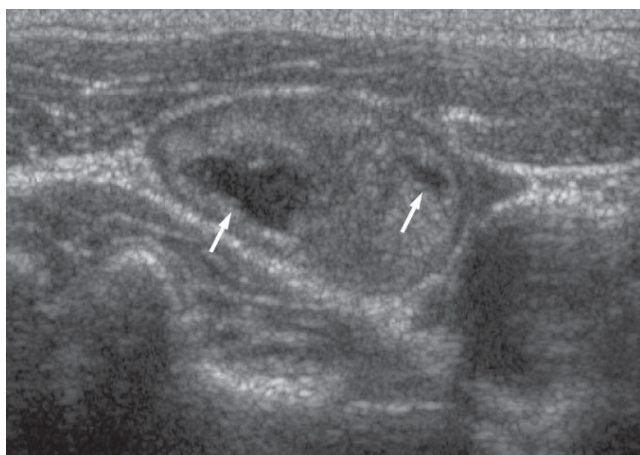


Figure 10 Transverse sonogram showing a metastatic node with intranodal cystic necrosis (arrows).

Intranodal necrosis may be found in malignant and inflammatory nodes, with cystic necrosis more common than coagulation necrosis. Cystic necrosis is common in tuberculous nodes^{20,21}, and metastatic nodes from squamous cell carcinomas⁴ and papillary carcinoma of the thyroid^{4,37}. Lymphomatous nodes seldom show cystic necrosis unless the patient has previous radiation therapy or chemotherapy, or has advanced disease^{5,40}.

Adjacent soft tissues edema

Granulomatous and metastatic nodes can invade the surrounding soft tissues and cause edema or induration^{20,40}. On ultrasound, the soft tissues edema is identified by diffuse hypoechogenicity with loss of fascial planes (Figure 11). It has been reported that adjacent soft tissues edema is common in tuberculous lymphadenitis (43% - 49%)^{20,21}. Therefore, it is a useful feature for diagnosing tuberculosis. However, soft tissue edema may also be found in patients with previous radiation therapy of the neck²⁵.

Matting

Matting is considered as clumps of multiple abnormal nodes with no normal intervening soft tissues (Figure 12), and it is

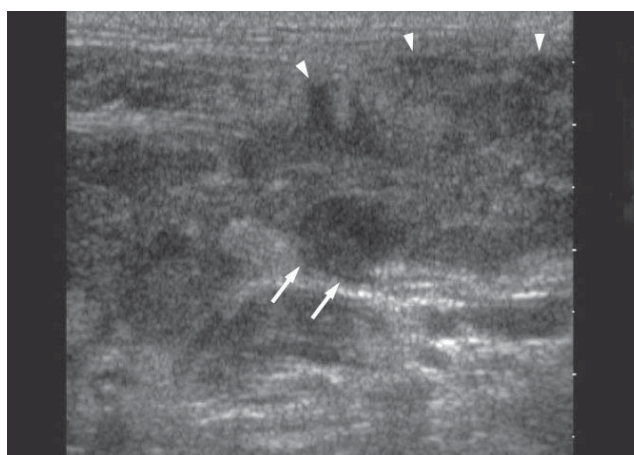


Figure 11 Transverse sonogram of a tuberculous node (arrows). Note the adjacent soft tissues edema which appears heterogeneous and hypoechoic with loss of fascial planes (arrowheads).

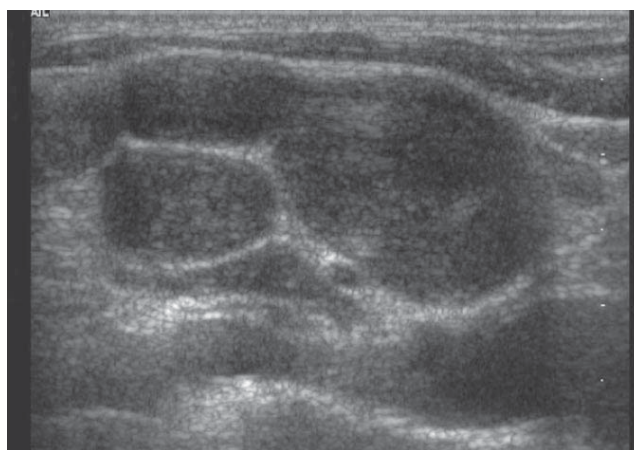


Figure 12 Sonogram showing matting of multiple tuberculous nodes.

a common feature in tuberculous lymphadenitis (59% - 64%)^{20,21}. The high incidence of matting in tuberculous nodes is considered to be the result of periadenitis and adjacent soft tissues edema. Since matting of lymph nodes is common in tuberculous lymphadenitis, it is a useful feature to differentiate tuberculosis from other diseases.

Vascular pattern

It has been reported that the evaluation of the vascular pattern of normal and abnormal cervical lymph nodes is highly reliable, with a repeatability of 85%⁴¹. Small normal lymph nodes (maximum transverse diameter < 5 mm) usually do not show vascular signals as the blood vessels are too small to be detected. Approximately 90% of normal lymph nodes with a maximum transverse diameter greater than 5 mm present with hilar vascularity³³. Normal and reactive lymph nodes usually present with hilar vascularity, or may seem to be apparently avascular⁴²⁻⁴⁵.

Peripheral or mixed vascularity are common in metastatic nodes^{42-44, 46, 47}. Therefore, the presence of peripheral vessels in lymph nodes is highly suspicious of malignancy. The peripheral vascularity in metastatic nodes is related to tumour infiltration of the lymph nodes in which the tumour

cells produce tumour angiogenetic factor (TAF), which causes angiogenesis and recruitment of peripheral vessels^{42-44, 46}. A lymph node with a mixed vascularity is a condition where angiogenesis occurs and peripheral vessels are induced, whilst the pre-existing hilar vessels are preserved until they are destroyed by the tumour cells at a later stage⁴³.

Unlike metastases, lymphomatous nodes tend to have mixed vascularity, while pure peripheral vascularity is relatively less common^{43, 46, 48}.

The vascular pattern of tuberculous nodes is variable, which simulate both benign and malignant conditions⁴⁹. Nevertheless, apparent avascularity and displaced hilar vascularity are commonly seen in tuberculous nodes⁴⁹. Displaced hilar vascularity in tuberculous nodes is related to the high incidence of focal cystic necrosis within the lymph nodes, which displaces the vessels towards the periphery (Figure 13). In lymph nodes with extensive cystic necrosis, blood vessels are destroyed and thus they appear apparently avascular⁴⁹.

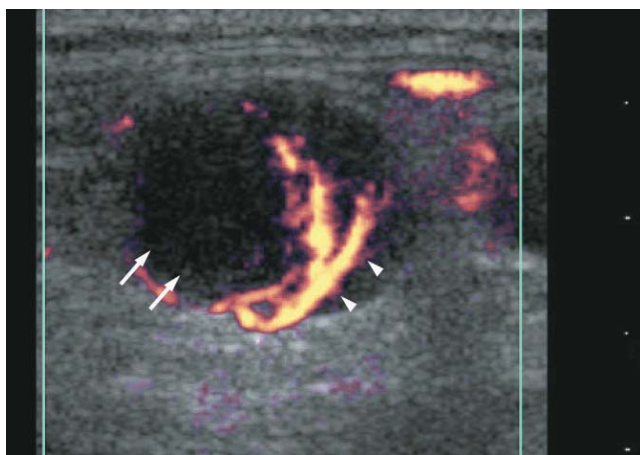


Figure 13 Power Doppler sonogram showing a tuberculous node with intranodal cystic necrosis (arrows) which displaces the hilar vessels towards the peripheral (arrowheads).

Vascular resistance

In evaluation of the vascular resistance (RI and PI) of cervical lymphadenopathy, different values (mean, highest and lowest) were used in previous studies^{43, 44, 46, 50, 51}. However, our previous study showed that the mean RI and PI have a higher repeatability than their highest and lowest values⁴¹. Nevertheless, the value of vascular resistance in differentiating malignant from benign lymph nodes is controversial. There are reports that the vascular resistance of metastatic nodes is higher than that of reactive nodes^{43, 44, 46, 48, 51}. However, another study suggested that malignant nodes have a lower vascular resistance than benign nodes⁵⁰. The difference in the results is probably related to the inconsistency of methodology. In our previous studies, we have found that metastatic nodes tend to have higher vascular resistance than reactive nodes, except for metastatic nodes from papillary carcinoma of the thyroid which usually show low vascular resistance^{47, 52}.

Previous studies suggested different cut-off values of RI (0.6, 0.7 and 0.8) and PI (1.1, 1.5 and 1.6) in differentiating metastatic and reactive lymph nodes, and reported different

sensitivities (RI, 47% - 81%; PI, 55% - 94%) and specificities (RI, 81% - 100%; PI, 97% - 100%)^{43, 44, 46, 50}. Our previous study suggested that the optimum cut-off of RI and PI are 0.7 and 1.4 respectively, with a sensitivity of 86% and 80% respectively, and a specificity of 70% and 86% respectively⁴⁷.

CONCLUSIONS

Normal cervical lymph nodes are usually found in submandibular, parotid, upper cervical and posterior triangle regions. They are hypoechoic and predominantly elliptical in shape, except for submandibular and parotid nodes. An echogenic hilus and hilar vascularity are usually found in lymph nodes with a maximum transverse diameter greater than 5 mm.

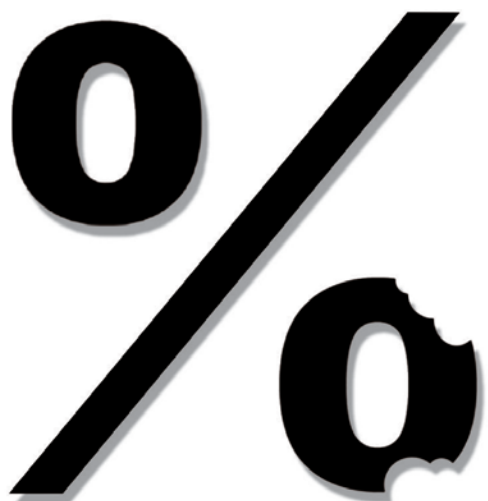
Cervical lymphadenopathy from various causes has a specific distribution. Malignant and tuberculous nodes tend to be large, round, hypoechoic and without echogenic hilus. Metastatic nodes from papillary carcinoma of the thyroid are usually hyperechoic and show intranodal cystic necrosis and calcification. Micronodular appearance is a specific feature of lymphomatous nodes when a high resolution transducer is used. The presence of cystic necrosis, adjacent soft tissue edema and matting of nodes are useful features to identify tuberculous nodes. In power Doppler sonography, the presence of peripheral vascularity in lymph nodes is highly suspicious of malignancy. Displaced hilar vascularity is usually found in tuberculous lymphadenitis.

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Ultrasound of salivary glands

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INTRODUCTION

Salivary gland masses are commonly encountered by surgeons and radiologists in daily practice. Clinical examination alone is often insufficient to identify the origin and nature of the mass. Imaging is required in the vast majority of cases. Being paired superficial structures, the parotid and submandibular glands are suitable for high-resolution ultrasound examination and its role is well established^{1,2}. The ultrasound examination can be easily combined with fine needle aspiration cytology (FNAC) further enhancing its ability to differentiate between benign and malignant lesions.

TECHNIQUE

Ultrasound of the parotid gland is performed using a high-resolution (7-12MHz) linear array transducer. Transverse and longitudinal scans are obtained with the patient supine and the head turned away from the side being examined. Transverse scans are performed with the transducer perpendicular and inferior to the ear lobe. When performing longitudinal scans, particular attention should be paid to the tail of the parotid gland which may be obscured by the ramus of mandible.

The submandibular gland is evaluated using a high-resolution (7-12MHz) linear transducer. Transverse scans using a submandibular view provide most of the information. Oblique and coronal adjustments help to localize lesions and to trace vessels.

Colour-flow imaging is a useful adjunctive tool and should be performed whenever a mass is seen on gray scale ultrasound.

It is important to scan both sides for symmetry and to exclude further clinically non-palpable lesions, as there is a chance of bilateral disease (eg Warthin's tumour). Regional nodal territories in the neck should be included as part of ultrasound examination of the salivary glands.

ANATOMY

The parotid gland is the largest of the salivary glands. The gland lies in the parotid space which is the most lateral space in the nasopharyngeal area. It extends from the external auditory canal superiorly to the level of angle of mandible inferiorly. On high-resolution ultrasound it shows uniform, fine bright internal echoes. The facial nerve creates an artificial plane dividing the gland into superficial and deep lobes which is important from the surgical point of view. Ultrasound cannot identify the facial nerve definitely, but its course can be inferred from the vascular plane (which is readily identified by ultrasound and consists of external carotid artery and retromandibular vein). Stensen's duct is visible as a fine echogenic line within the superficial lobe. Intraparotid lymph nodes are commonly seen on ultrasound. They mainly lie within superficial lobe and appear as round

or oval hypoechoic nodules, generally less than 5mm in diameter and are usually well-defined. An echogenic hilum differentiates intraparotid nodes from other parotid masses.

The submandibular gland is a well-encapsulated structure with homogeneous hyperechogenicity similar to that of parotid gland. On high-resolution ultrasound, multiple discrete fine linear streaks representing intraglandular ductules are commonly seen. The free border of the mylohyoid muscle divide the gland into imaginary superficial and deep lobes. Wharton's duct is clearly seen when it is abnormally dilated, but can be seen in normal cases in the oblique scans.

PATHOLOGY

Sialolithiasis

Submandibular calculi are more common than parotid calculi. The greater number (80%) of calculi that occur in the submandibular gland is attributed to the greater mucous content of the saliva produced by the submandibular gland. 90% of submandibular calculi are radio-opaque whereas only 10% of parotid ductal calculi are opaque. For the detection of salivary calculi, ultrasound is the investigation of choice, with a sensitivity of 94%, specificity of 100% and an accuracy of 96%³. Intra-glandular ductal dilatation and an intra-ductal echogenic filling defect casting posterior acoustic shadowing are the hallmark ultrasound features of sialolithiasis (Figure 1). Ultrasound can accurately localize whether the calculus is intraglandular or within the main salivary duct. This affects patient management, particularly for submandibular calculi. For intraglandular calculi, the

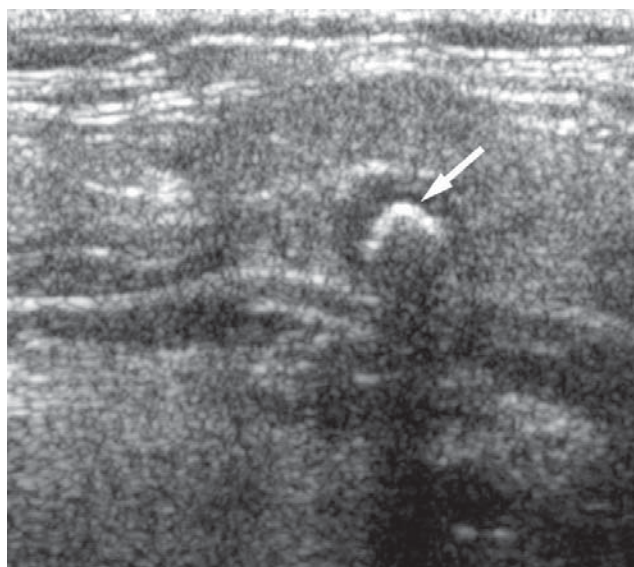


Figure 1 Transverse gray scale sonogram of the submandibular gland showing an echogenic focus (arrow) with posterior acoustic shadowing, diagnostic of an intraglandular ductal calculus.

gland may have to be removed whereas for main salivary duct calculi, exploration of the duct with stone removal is often successful. Complications of calculi, including sialoceles and abscess, can be easily identified with ultrasound⁴.

Inflammation

1. Acute bacterial infection

The parotid is the salivary gland most commonly affected by acute suppurative sialadenitis. The organism is usually *Staphylococcus aureus*, but *Streptococcus pneumoniae*, *Escherichia coli* and *Haemophilus influenzae* have also been isolated.

The acutely inflamed gland is enlarged and hypoechoic on ultrasound. The parenchyma may have a heterogeneous pattern attributable to the presence of microabscesses, localized duct dilatation or retention cysts (Figure 2). If left untreated, this may progress to an abscess, seen as an ill-

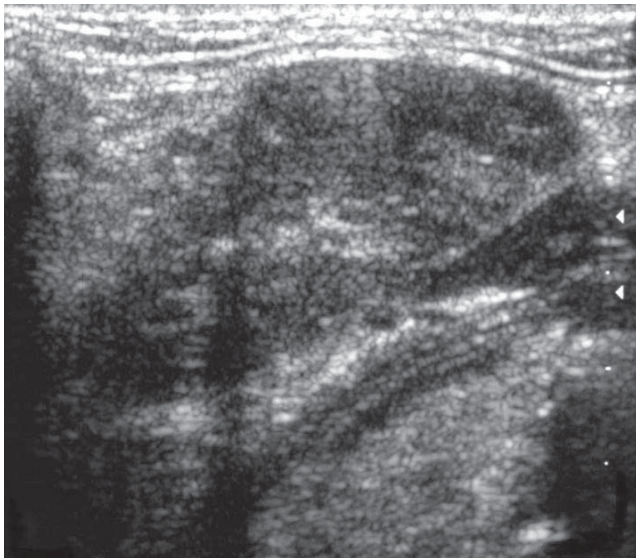


Figure 2 Transverse sonogram of the right submandibular gland demonstrating acute sialadenitis. Note the gland shows rounded contour and a diffusely hypoechoic heterogeneous echopattern.

defined hypoechoogenicity within the gland, sometimes with a frank fluid content (Figure 3). Painful parotid or neck nodes are often enlarged and it is possible that these nodes may also liquefy to produce further abscesses. Ultrasound-guided aspiration allows microbiological identification of the organism for appropriate antibiotics therapy. In cases of a unilocular abscess this may negate the need for surgery.

2. Viral infection

Viral infection, especially by the mumps virus, is a common cause of parotid swelling. The diagnosis is usually clinical and imaging is seldom necessary. Ultrasound shows unilateral or bilateral glandular enlargement with a hypoechoic echotexture. Adjacent reactive adenopathy is commonly seen.

3. Chronic inflammatory conditions

There are a number of causes of chronic inflammatory sialadenitis which may be related to underlying sialolithiasis or other pathologies, which include Sjogren's syndrome and chronic sclerosing sialadenitis (Kuttner tumour of the submandibular gland).

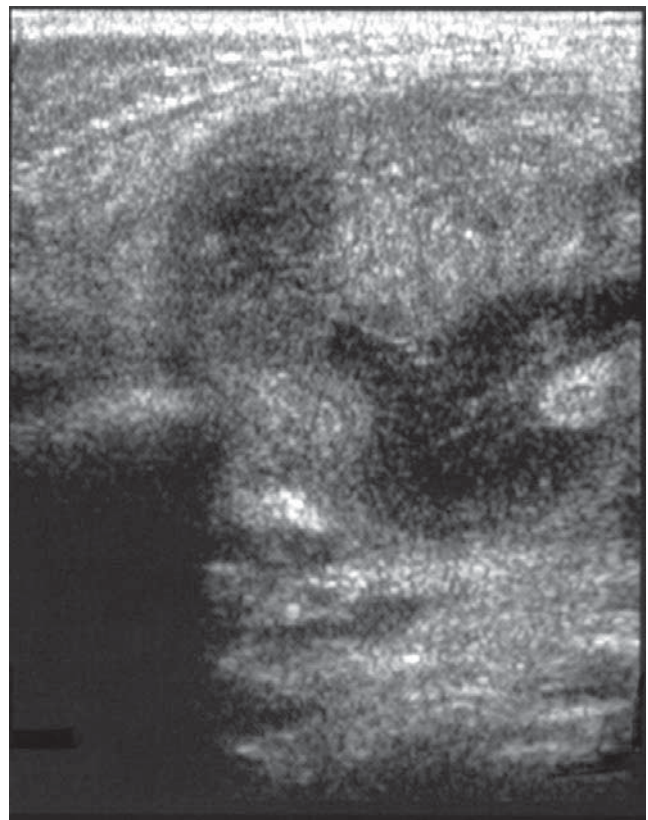


Figure 3 Transverse gray scale sonogram showing a heterogeneous mass with ill-defined edges, cystic changes and internal debris. The ultrasound appearances and the relevant clinical history point to the diagnosis of an abscess.

Sjogren's syndrome is an autoimmune disease seen most commonly in middle-aged females. The diagnosis is made clinically and confirmed by sublabial biopsy if necessary. The role of ultrasound is to confirm or exclude salivary gland involvement and to look for lymphomatous change in the cervical lymph nodes as there is an association of lymphoma with Sjogren's syndrome which signals a grave prognosis⁵. In the early stage the salivary glands may be normal or show diffuse enlargement with normal echogenicity. The late features are more diagnostic: a heterogeneous echopattern with multiple round hypoechoic areas within the parenchyma, sometimes containing frank cystic changes⁶. In long-standing disease, the involved glands appear small and atrophic with a hypoechoic echotexture^{7,8} or may have a reticulated pattern⁹.

Chronic sclerosing sialadenitis (Kuttner tumour) is a tumour-like condition characterized clinically by a firm swelling of the gland and histologically by periductal sclerosis, lymphocytic infiltration with lymphoid follicle formation, reduction of secretory gland parenchyma and fibrosis¹⁰. The submandibular glands are more commonly involved and parotid involvement is rare¹¹. The most typical ultrasound appearance is a diffuse cirrhotic-like pattern: bilateral diffuse involvement with multiple hypoechoic lesions against a heterogeneous background resembling a cirrhotic liver (Figure 4). The glandular vascularity is prominent with no mass effect or displacement of these vessels as they course through the parenchyma¹².



Figure 4 Transverse gray scale sonogram of the right submandibular gland showing glandular enlargement with lobulated outline and 'cirrhotic-like' echopattern. These features represent chronic sclerosing sialadenitis (Kuttner tumour).

Salivary gland neoplasms

Patients with salivary gland tumour usually present with a palpable lump. In evaluating a focal mass in a salivary gland, the first step is to identify if the mass is intraglandular or extraglandular. Up to 20% of clinically diagnosed salivary gland masses are found by ultrasound to be due to lesions outside the salivary gland¹³. For a parotid lesion, it is important to determine its deep lobe involvement, as the surgical approach would be different. In cases of extensive deep parotid lobe involvement, extra-parotid components such as parapharyngeal space extension, ultrasound alone is insufficient to assess the full tumour extent. Cross-sectional imaging with computed tomography (CT) or magnetic resonance imaging (MRI) is necessary in these circumstances.

Once it is established that the neoplasm is intra-glandular in origin, the next step is to determine its nature, i.e. benign or malignant. The ultrasound distinction of benign and malignant lesions is not precise, but certain features should raise suspicion for malignancy. These include: if the margin of the lesion is ill-defined or is locally invasive, if the mass is in the deep lobe, and if abnormal cervical lymph nodes are present. Ultrasound is able to diagnose a benign lesion in over 80% of cases¹⁴. Colour Doppler may help in diagnosing malignancy when there is disorganized internal colour flow. The accuracy can be further enhanced by FNAC under ultrasound guidance, particularly with the help of an experienced cytopathologist¹⁵.

Benign neoplasms

1. Pleomorphic adenoma

Pleomorphic adenoma is the most common (60-80%) of the parotid neoplasms. Women are more commonly affected than men and patients are usually greater than 40 years of age at the time of diagnosis. It is ten times more common in the parotid gland than in submandibular gland.

Approximately 90% arise from the superficial lobe and are adequately assessed by ultrasound alone. In about 25% of pleomorphic adenomas there are associated small satellite nodules away from the main tumour¹⁶. Malignant transformation and calcification are known to occur in long standing tumour¹⁷. Recurrence rate varies between 1% and 50%¹⁸.

On ultrasound this tumour appears as a homogeneous, hypoechoic solid mass, usually less than 3cm in size (Figure 5). It is round or oval in shape and well-defined with lobulated margins. Quite often there is posterior acoustic enhancement. Lesions larger than 3cm are more prone to cystic or haemorrhagic degeneration which modify the internal architecture and may also exhibit ill-defined edges, thus making differentiation from a malignant lesion difficult. Calcification may also occur in longstanding tumour.

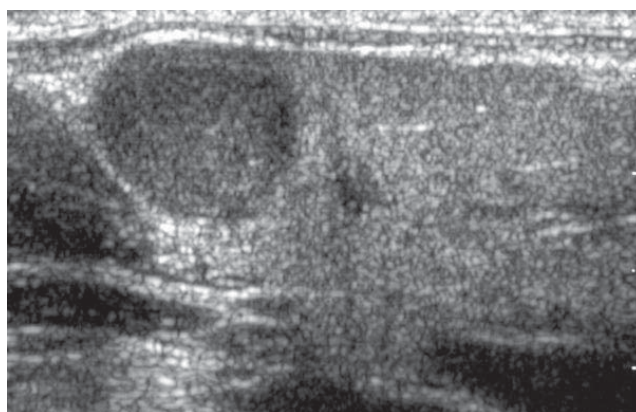


Figure 5 Transverse gray scale sonogram showing a well-defined, round, homogeneous, hypoechoic lesion in the left submandibular gland. These features suggest a benign salivary gland lesion. Note the posterior acoustic enhancement commonly seen with pleomorphic adenoma.

The colour Doppler pattern of pleomorphic adenoma is variable but commonly shows increased peripheral vessels, mainly venous in nature¹⁹.

2. Warthin's tumour (adenolymphoma)

Warthin's tumour account for 6-10% of all salivary gland neoplasms. It is more common in elderly men than women. The apex of the superficial lobe of parotid gland is the commonest site of involvement. About 15-30% are bilateral.

On ultrasound, a Warthin's tumour is typically a well-defined hypoechoic lesion with internal heterogeneity of solid and cystic areas (Figure 6). It may also appear anechoic with through transmission. Colour flow Doppler may show vessels in a hilar distribution.

3. Others

Other benign neoplasms such as lipoma (Figure 7), oncocytoma and haemangioma are less commonly seen.

Malignant neoplasms

Malignant epithelial tumours of salivary gland account for 17% of all epithelial tumours. The smaller salivary glands have greater malignant potential, a tumour in the sublingual or submandibular gland being more likely to be malignant than a tumour in the parotid gland. Ultrasound alone may



Figure 6 Transverse gray scale sonogram showing a relatively well-defined cystic lesion with slightly lobulated margin and internal debris in the tail of parotid gland. Features suggest a Warthin's tumour.

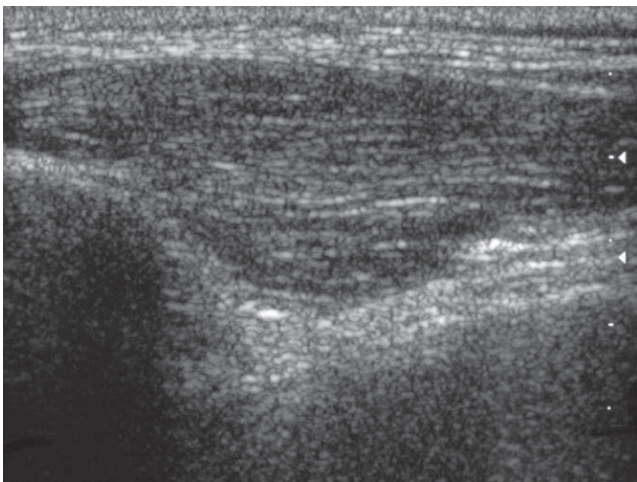


Figure 7 Transverse gray scale sonogram showing a well-defined hypoechoic lesion with fine linear striations parallel to the transducer within the left parotid gland. Features are diagnostic of a lipoma of parotid gland.

predict malignancy in 80-89% of cases²⁰. The ultrasound features are similar for all malignant tumours and it is not possible to differentiate between the histological types.

1. Mucoepidermoid carcinoma

Mucoepidermoid carcinoma accounts for 5-10% of all salivary gland neoplasms. It occurs at any age with no sex predilection. It is the most common malignant tumour of childhood. Most of these tumours are slow growing and present as firm or hard mass. There is a tendency for local tumour invasion. Pain or itching in facial nerve territory is suspicious of a malignant parotid tumour.

The ultrasound features are different for low-grade tumours compared to high-grade tumours. A low-grade tumour may

appear as a well-defined, homogeneous, hypoechoic lesion similar to a benign tumour. For a high-grade tumour, it has an ill-defined infiltrative margin with a heterogeneous internal architecture (Figure 8). Ultrasound may also detect any regional nodal metastases in the neck. Colour Doppler is more likely to show an increased and chaotic flow within the lesion.

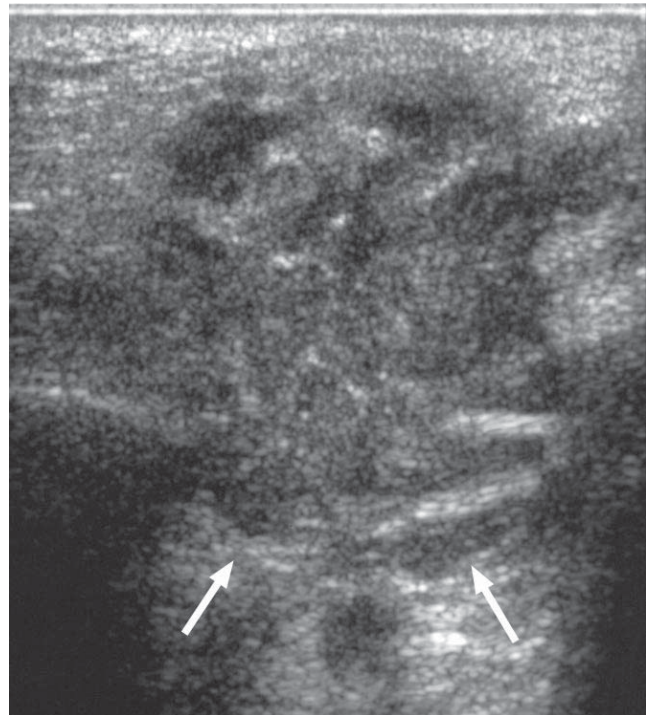


Figure 8 Transverse gray scale sonogram showing an ill-defined, heterogeneous, hypoechoic lesion with infiltrative margin in the right parotid gland. Features are diagnostic of a malignant lesion (final diagnosis - high grade mucoepidermoid carcinoma). Note the extension into the deep lobe (arrows).

2. Adenoid cystic carcinoma

This accounts for 3% of all parotid tumours and 15-17% of all submandibular tumours. It tends to show infiltration of adjacent structures and is prone to perineural spread. Ultrasound features are similar to mucoepidermoid carcinoma.

3. Acinic cell carcinoma

This accounts for 2-4% of salivary gland malignancies. Ultrasound may show intratumoural cystic changes, but otherwise features are non-specific.

4. Others

Metastases (from head and neck carcinoma, especially nasopharyngeal carcinoma) (Figure 9) and non-Hodgkin lymphoma (Figure 10) are rarely encountered. Melanomas in the region of the parotid gland also frequently metastasize to the parotid gland.

CONCLUSION

Ultrasound combined with FNAC is the initial investigation of choice for salivary gland disease. It answers most clinical questions and provides the surgeon with relevant pre-operative information. Evaluation of deep lobe disease of

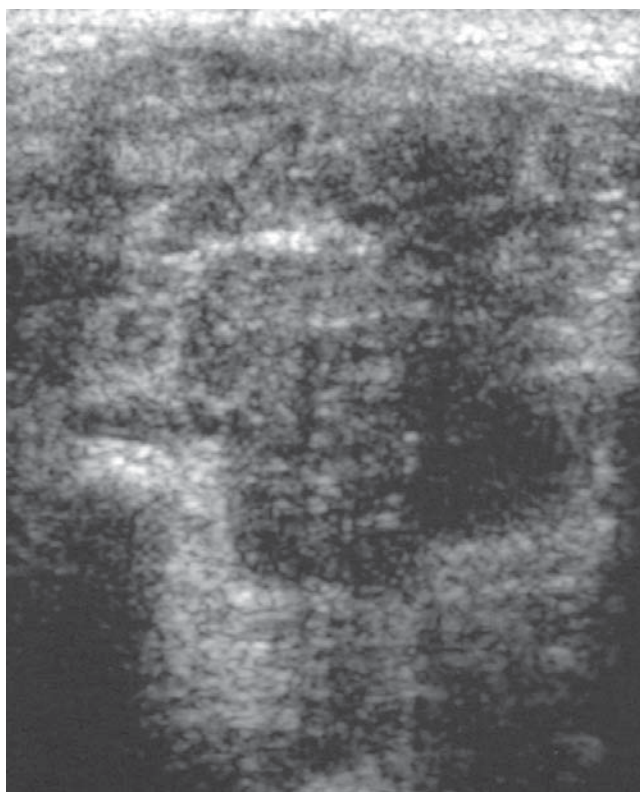


Figure 9 Transverse gray scale sonogram showing an ill-defined, heterogeneous, hypoechoic lesion in the left parotid gland. Features are those of a malignant lesion (patient had known history of nasopharyngeal carcinoma, the final diagnosis was a metastatic lesion).

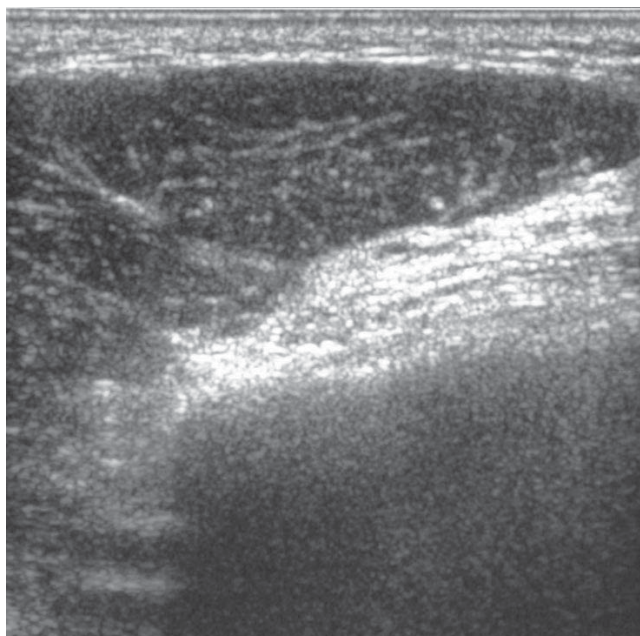


Figure 10 Transverse gray scale sonogram of the right parotid gland showing glandular enlargement with hypoechoic and reticulated echopattern. Features are compatible with lymphoma which was confirmed by a biopsy.

the parotid gland, and parapharyngeal extension is not possible by ultrasound alone, and further imaging such as CT or MRI is required.

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Prenatal ultrasound diagnosis of single umbilical artery (SUA) and pregnancy outcomes

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SUMMARY

The presence of a single umbilical artery (SUA) identified during routine morphological assessment in the second trimester is not rare. This retrospective descriptive study examines five cases where the prenatal ultrasound diagnosis of single umbilical artery (SUA) was made between seventeen and twenty-one weeks and reports on the outcomes of pregnancy.

In three of five cases there were associated abnormalities including one case of Dandy Walker variant confirmed after birth, a complex structural cardiac anomaly and one case of polyhydramnios. Fetal karyotype was assessed as normal in two cases.

Clinical growth restriction was suspected in one case but not confirmed. Doppler studies were undertaken in three cases and was abnormal in one case, complicated by polyhydramnios.

SUA is associated with structural and chromosomal abnormalities in around one third of cases. Common structural abnormalities in decreasing order of incidence are cardiac, gastrointestinal, central nervous system, genitourinary, respiratory and musculoskeletal. Chromosomal abnormalities include trisomy 13 and 18. A short review of the literature and management guidelines are presented.

INTRODUCTION

The normal umbilical cord consists of two umbilical arteries and one umbilical vein surrounded by Wharton's jelly. A single umbilical artery (SUA) has an incidence of 0.5%¹ with a higher prevalence in twin pregnancies². The aetiology remains unknown but the most likely mechanism is atrophy of the second umbilical artery during development.^{3,4}

The clinical implications of SUA include an increased incidence of congenital and karyotype abnormalities, intrauterine growth restriction, premature birth and fetal death. Interpretation of Doppler velocimetry is problematic as estimates of normal values are based on the presence of two umbilical arteries. Patient counselling in the setting of SUA is required, especially with respect to fetal karyotyping.

The reported sensitivity and positive predictive value of sonographically detected SUA is 65%⁵. It is noted that two and three vessels can co-exist in different segments of the same umbilical cord⁶.

This paper reports the findings in five patients seen at a regional Queensland Base Hospital over twelve months with a prenatal ultrasound diagnosis of single umbilical artery.

MATERIAL AND METHODS

The perinatal database was searched to find patients who had delivered at Bundaberg Base Hospital with a two-vessel umbilical cord during the study period.

Relevant data were extracted from patient records, including age, parity, clinical evidence of intrauterine growth restriction

and any tertiary referral for fetal karyotyping, pregnancy outcomes including birth weight, naked eye placental examination, post delivery and paediatric follow-up.

Data extracted from sonographic records included the gestational age at the time of identification, the presence of coexisting abnormalities, evidence of growth restriction and Doppler readings.

RESULTS

Five cases of SUA were identified. The mean age was twenty-eight years. Four of five were multips. Clinical growth restriction was detected in one case and this was confirmed on ultrasound criteria. Tertiary referral to a fetal unit was undertaken in two cases, with a normal karyotypes established in both.

The sonographic diagnosis was made in all cases between seventeen and twenty-one weeks. In three of five cases there were other abnormalities. In one case there was an amniotic band and a dilated fourth ventricle suggesting a Dandy Walker variant. In one case structural cardiac anomalies consisting of a small left ventricle; dominant right ventricle; a large right outflow tract and a large VSD were detected. The third case had idiopathic polyhydramnios.

Doppler velocimetry was obtained in three cases in the third trimester and the mean Doppler reading was 3.36. In one case a value in excess of 4.0 was obtained, but this pregnancy was complicated by hydramnios.

In three cases delivery was *per vaginam*, in one elective Caesarean section was performed for obstetric reasons and in one case there was elective termination of the pregnancy.

There were no cases of low birth weight (less than 2500g) in the term deliveries and one infant had a Dandy Walker variant confirmed after delivery.

All placentas showed a two-vessel cord, examined at the point of transection.

DISCUSSION

SUA have been associated with structural and chromosomal abnormalities. Common structural abnormalities in decreasing order of incidence are cardiac, gastrointestinal, central nervous system, genitourinary, respiratory and musculoskeletal systems.

The incidence of structural abnormalities has been reported in one study as 31% (in keeping with the two in five in this review). Where SUA was the only sonographic abnormality, 7% of neonates had some structural abnormality when examined post delivery⁷.

No cases of chromosomal abnormalities were identified in this study, in keeping with other studies where abnormal chromosomes are reported in 11.3% of fetuses with SUA, most commonly trisomy 13 and 18⁸.

Prenatal ultrasound diagnosis of single umbilical artery (SUA) and pregnancy outcomes

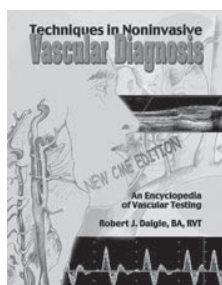
Although growth restriction was clinically and sonographically suspected in one case, the birth weight was in excess of 2500g. Growth restriction is reported to occur in association with SUA and was detected in 10.2% in one study⁹.

One patient demonstrated elevated cord Doppler values but this pregnancy was complicated by hydramnios. Doppler readings in pregnancies with SUA are generally towards the lower end of the normal range, attributed to the larger arterial diameter which may be associated with decreased flow resistance¹⁰. Doppler abnormalities have been reported to occur in 30% of fetuses with SUA. Abnormal Doppler readings in SUA are highly associated with growth restriction, complex structural malformations or an abnormal karyotype¹¹.

A suggested protocol for the management of prenatally diagnosed SUA on ultrasound includes a detailed sonographic evaluation with fetal echocardiography possibly at a tertiary fetal ultrasound or cardiac unit. The finding of a second pertinent sonographic abnormality is an indication for karyotype determination. Clinical growth monitoring for the remainder of the pregnancy appears indicated, augmented by Doppler velocimetry where there is clinical concern. Counselling of the parents should include a description of the recognized associations and impact on fetal/perinatal mortality.

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ASUM

Reports from:
 President
 CEO
 Honorary Secretary
 Honorary Treasurer
 Committees
 Member Services

Annual Report 2002-2003



Financial accounts are issued as an insert for full members, honorary fellows and life members.



Councillors 2002/2003

President

Dr Glenn McNally

Immediate Past President

Dr Stan Barnett

Honorary Secretary

Mrs Roslyn Savage

Honorary Treasurer

Dr Dave Carpenter

Medical Councillors

Dr Matthew Andrews

Dr Roger Davies

Dr Charles Fisher

Dr David Rogers

Sonographer Councillors

Mr Stephen Bird

Ms Kaye Griffiths AM

Ms Janine Horton

Secretariat Office**Chief Executive Officer**

Dr Caroline Hong

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Note: The financial accounts have been issued to Full Members, Life Members, Honorary Fellows and Corporate Members

President's message

It is now almost a year since I commenced duties as ASUM President, following on from a remarkable predecessor - Dr Stan Barnett. This past year has been fascinating, challenging, sometimes exhausting but seldom frustrating and I am gratified by and indeed indebted to the activities of so many members of the Society.

Amongst Stan Barnett's considerable achievements were the establishment of the Asia Link Program, the initiation of ASUM's bid to host the WFUMB 2009 Meeting and bringing about alteration to ASUM's constitution. Much of my efforts during the past year have in fact involved consolidating these initiatives and I am happy to report that this has generally been achieved.

A new constitution was adopted at the last Annual General Meeting held in conjunction with the Annual Scientific Meeting at the Gold Coast. The function of Council since the change has been excellent with the Society's business being attended to expeditiously and effectively. Of course the smooth functioning of the ASUM Office has underpinned the excellent functioning of Council in the past year.

Most members would know that our bid to host the WFUMB 2009 Meeting in Sydney was successful. The final part of the bidding process occurred at the WFUMB/AIUM meeting held recently in Montreal. Stan Barnett, Caroline Hong and myself were on hand in Montreal to present ASUM's bid. We received considerable support from the Sydney Convention and Visitors Bureau along with ICMS Pty Ltd. The vote in favour of ASUM was decisive and I believe this is largely due to the wonderful efforts of Stan Barnett and Caroline Hong in preparing our bid. Much work will be required between now and 2009 and I hope once again most ASUM members will be generous with their time and expertise in supporting our preparation for this meeting.

The Asia Link Program continues to develop. Of note will be the joint ASUM/MUST (Medical Ultrasound Society of Thailand) meeting to be held in November of this year in Bangkok. Continuing liaison and development of the program continues with our sister societies in Korea, Singapore, Malaysia, Bangladesh and Indonesia.

The 2002 Annual Scientific Meeting held at the Jupiters Casino on the Gold Coast was a great success. The program and the meeting organization were first class. The Skills Day was a great success and the social aspects of the meeting were greatly enjoyed by all.

This year marked the commencement of the ASUM Multidisciplinary Workshop. The first meeting was held in March in Sydney. It was very well attended and the feedback was very positive. Particular thanks go to Dr David Rogers and Mr Keith Henderson for organising this inaugural Multidisciplinary Workshop. The establishment of this workshop in the early part of each year will now give ASUM two flagship meetings well spaced apart during the year. We are looking forward to continuing success for this endeavour.

I must thank all our committees and their members for their diligence and hard work. In particular, I must thank Ms Bonita Anderson who chaired the reconstituted DMU Board of Examiners for the first part of the year and did much of the work required for its reorganisation. Roslyn Savage has taken over as the Chair of this Board and we very much hope that the DMU candidates benefit from the considerable effort that has gone into reorganising this Board. The Board has also undertaken the enormous task of producing ASUM's application to Australasian Sonographer Registry for full recognition of the DMU. Mrs Margo Gill has provided invaluable assistance to the Board in this endeavour. The DDU Board of Examiners under the chairmanship of Dr Chris Wriedt has once again provided great support to the Society.

I am grateful to all members of the ASUM Executive and Council for their support and their hard work in advancing the aims and objectives of the Society. The efforts of Dave Carpenter as Honorary Treasurer and Roslyn Savage as

Cont'd on page 5

Chief Executive Officer's report

The financial year of 2002-2003 saw many major positive changes in ASUM.

In September 2002, a new Council was elected in accordance with the new Constitution, resulting in a leaner and more effective Council size of 12 Councillors, consistent with current best practice in corporate governance. Dr Stan Barnett was the key driver in achieving the changes in the Constitution which was adopted in April 2002.

The Society is indebted to Dr Stan Barnett who served his Presidential term from 2000 to 2002 with distinction, making many major achievements, including instituting the Asia Link Program and leading the WFUMB 2009 bid process. Stan completed his Presidential term in September 2002 and remains active in his role as Immediate Past President and Chair of the ASUM Asia Link Program.

Dr Glenn McNally, then President Elect, became President of ASUM on 21 September 2002 at the Annual General Meeting held at the Conrad Jupiters Resort at the Gold Coast, during the 32nd ASUM Annual Scientific Meeting. The last 12 months have been extremely exciting and challenging, especially working with a progressive and forward thinking Council, under the leadership of Dr Glenn McNally. Much has been achieved during the last 12 months and ASUM has made its stamp in many areas, some of which are listed below:

ASIA LINK PROGRAM

Ultrasound training workshops were conducted by Dr Andrew Ngu and Dr Glenn McNally in Bangkok, Thailand in November 2002. A meeting of ASUM and representatives of the Medical Ultrasonic Society of Thailand (MUST) in October 2002, resulted in an agreement for the first joint meeting of ASUM and MUST to be held in November 2003 in Bangkok. There is ongoing communication and continuing liaisons between ASUM and KMSU (Korea), MUSS (Singapore), MSUM (Malaysia), BSU (Bangladesh) and ISUM (Indonesia).

WORLD FEDERATION FOR ULTRASOUND IN MEDICINE

On 31 May 2003, ASUM achieved a major milestone and made its mark in the Society's history by winning the bid to host the WFUMB 2009 World Congress in 2009 in Sydney. ASUM's winning bidding team consisted of Dr Glenn McNally, Dr Stan Barnett and Dr Caroline Hong. They attended the WFUMB 2003 Congress in Montreal and presented to the WFUMB Council on ASUM's capabilities and Sydney's attractions in hosting a world congress in 2009. The bidding process has been an intense and challenging experience over the past 2 years. ASUM also exhibited an educational booth at the WFUMB 2003 Congress in Montreal with support from two other Councillors, Dr Dave Carpenter and Ms Janine Horton. Winning this bid is a major achievement for ASUM globally. The ASUM Council has already appointed Dr Stan Barnett as the Convenor for the WFUMB 2009 Congress to be hosted by ASUM from 5-9

September 2009 at the Sydney Convention and Exhibition Centre in Darling Harbour, Sydney.

ASUM 2002 ANNUAL SCIENTIFIC MEETING

The ASUM 2002 Annual Scientific Meeting held from 19-22 September 2002 at the Gold Coast was a roaring success. The meeting was attended by more than 500 delegates who enjoyed the stimulating scientific and social programs, thanks to a great local organizing committee led by Ms Roslyn Savage and supported by Dr Neil Orr, Mr Geoff Stieler and Ms Liz Carter. Overseas guest speakers included Professor Byung Ihn Choi from Korea, Mr Terry Needham from USA, Dr William Shiels from USA, Dr Deborah Levine from USA, Dr David Pilling from UK, Dr Flemming Forsberg from USA. Professor Choi was sponsored through a grant from the Australia-Korea Foundation and Dr David Pilling was sponsored through a mutual ASUM-BMUS Presidential exchange program. ASUM is grateful to TOSHIBA for being the Platinum Sponsor and GE Medical Systems for being the Gold Sponsor at ASUM 2002. ASUM is always grateful to its corporate supporters at all its educational and scientific meetings, including Philips and Siemens-Acuson. Members may be pleased to know that the surplus from the ASUM 2002 meeting allowed funds to be allocated to the ASUM Research and Grants, ASUM Asia Link Program, and the ASUM Education on-line project, which are all considered worthy projects relevant to members' needs and necessary for the growth of the Society.

ASUM MULTIDISCIPLINARY WORKSHOP

This innovative and new concept of running multidisciplinary workshops in one single venue and meeting is a first for ASUM. The workshop held in Sydney in March 2003 was such a huge success that another similar workshop has already been planned for March 2004 on the Gold Coast. Attendance numbers exceeded our anticipated figures and the general feedback was overwhelmingly positive, confirming the need for more of such workshops for the ultrasound professional community. The success of this workshop is attributed largely to the Convenor, Dr David Rogers, ASUM Education Officer, Mr Keith Henderson and all the volunteer speakers and presenters, as well as the corporate sponsors. The support of Philips and TOSHIBA as platinum sponsors, and Siemens and GE as gold sponsors was also very much appreciated.

COMMITTEES, BOARDS OF EXAMINERS AND BRANCHES

On a daily basis, I work very closely with the Executive Committee and members of Council. In particular, I wish to thank the President, Dr Glenn McNally and members of the Executive and Finance Committee, Dr Stan Barnett, Dr Dave Carpenter and Ms Roslyn Savage. Their professionalism, continuing support and decisive actions have often allowed me to tackle the myriad of issues within the ASUM Secretariat with minimal hassle. The Society is only as strong as the volunteers who give up their time and expertise so willingly to ASUM. Special thanks go to

the Chairs and members of Committees, Boards of Examiners and ASUM Branches. The DDU Board of Examiners, the DMU Board of Examiners, the Education Committee, the ASUM Bulletin editorial team, the DMU Advisory and Sonographer Affairs Committee, the DDU Development and Medical Affairs Committee, the Research and Grants Committee, the Safety and Standards of Practice Committee, and ASUM Branch Officers, all form the backbone and running engine of the Society, making ASUM relevant to the changing demands and expectations of the members and the ultrasound community. Much has been achieved in ASUM during the last 12 months through the work of the various committees, Boards of Examiners and volunteers in the ASUM Branches. More reports are included elsewhere in this publication.

ASUM SECRETARIAT

It would be remiss of me not to mention the work of my staff. My number one right and left hand support has been Iris Hui, my Executive Assistant. With her professional and competent office skills, it has been possible for me to focus on the bigger picture and strategic issues. Keith Henderson, Education Officer, has been most cooperative and innovative throughout the year and has been an invaluable support to me at the ASUM Secretariat. He has contributed enormously in his role as Education Officer and Co-Editor of the Bulletin. James Hamilton, DMU Coordinator is a real asset to ASUM, working through challenging demands of the DMU activities. James has introduced many systems and protocols to streamline the DMU examination process. Marie Cawood is always professional in her approach in attending to the complexities of membership matters, workshops and meeting registrations and coordinating DDU examination matters. Chris Phippen, accountant, is always on the ball with her eye for detail and keeping ASUM BAS statements and finance reports on track. Jenny Macklin, Assistant Education Officer, although a new member of staff, fits into the ASUM team so easily that it is as if she has always been here. In an increasingly competitive environment, it is important to get the best employees and to keep them by understanding what employees want.

There is sufficient flexibility without compromising quality and outcome within the ASUM Secretariat and I am pleased to report a happy and effective ASUM office team overall.

At a professional level, I am pleased to advise that in April 2003 I was appointed to the National Board of Directors of the Australian Society of Association Executives. In June 2003, I was admitted as a Fellow of the Society of Association Executives through an accreditation process. I am grateful to the ASUM Council for the support and encouragement in pursuing professional development, which I know will in turn benefit ASUM in many different ways.

A big thank you to all the ASUM members and volunteers who have been loyal and dedicated in promoting ASUM and excellence in ultrasound in their own way, locally and internationally. Finally, I would like to thank my family, husband Tom Boland, son James and daughter Vera for their understanding over the last year.

Dr Caroline Hong
Chief Executive Officer

ASUM SECRETARIAT TEAM

Caroline Hong
BDS(Uni Adel) GDHA(SA) AFCHSE CHE MHA(Uni NSW) FADI FSAE
Chief Executive officer

Iris Hui *FCIS*
Executive Assistant to CEO

Keith Henderson *MEd(Hons) BSc*
Education Officer

Jennifer Macklin *BVA (Hons)*
Assistant Education Officer

James Hamilton
BA DipEd DipCat GradDipRE MEdAdmin
DMU Coordinator

Marie Cawood
DDU Coordinator and Membership Registrar

Chris Phippen *BA CA*
Accountant

Honorary Treasurer's Report

The Treasurer would like to report an operating surplus of \$33435 for the financial year 2002-2003. This achievement has come about by careful monitoring and budgeting systems being implemented, prudent savings and revenue raised from other sources.

It is encouraging to see the increase in dollar value received in subscriptions. This has come about again this year by an increase in the numbers of members rather than an increase in the subscription rate.

The 2004-2005 budget for the Society was discussed during the Council Meeting on 1st March 2003. It was decided to recommend an increase in membership fees of approximately 5% overall. The full membership fee recommended is a 3.8% increase. The membership rates will be voted on at the Annual General Meeting. It should be noted that the membership

fees were last increased by 5%, for 2002-2003 however they had not be increased for three years prior.

At the World Federation for Ultrasound in Medicine and Biology 2003 Congress held in Montreal, it was announced that ASUM won the bid to host the WFUMB World Congress in 2009, in Sydney. With a successful bid such as this, there are expenses associated. It has been the decision of the Executive to charge these expenses this year. These include 2002 expenses totalling \$19,055 and 2003 expenses totalling \$52,832. These expenses will be recovered during the 2009 World Congress.

ASUM 2002 held on the Gold Coast was a great success and \$150,000 has been allocated to both the Asia Link Programme

Cont'd on page 5

Honorary Secretary's report

This being my first year as Honorary Secretary, I have had much to learn about the day to day running of the Society and all the work done by the Secretariat staff and all the myriad of volunteers who make the Society what it is for you, the members. Many thanks to all the secretariat staff who have helped me to settle in.

Dr Caroline Hong, the CEO, oversees the staff at the ASUM Secretariat Head Office and the day to day smooth operation of the Society, working closely with the President, the Executive Committee and Council for the overall strategic direction of the Society. This makes the position of Honorary Secretary a much less daunting task. Caroline's Executive Assistant, Iris Hui is also the ASUM Ultrasound Bulletin Production Co-ordinator and is one of the people most likely to answer any telephone queries at the ASUM Secretariat. Keith Henderson, Education Officer is supported by a new Education Assistant, Jenny Macklin who replaces Tim Brown. Tim has left to undertake religious studies for twelve months. Keith and Jenny are responsible for all the educational aspects of the Society including the maintenance of your MOSSIP records. They are also responsible for the web site which is improving each year. Soon there will be a very exciting addition to the web site – an on-line reference facility which will be previewed at ASUM 2003 and upcoming educational meetings and in the Bulletin, so keep a look out for that. James Hamilton is the Co-ordinator for the DMU for which there are 132 Part I Candidates and 130 Part II Candidates this year. The DMU Board of Examiners has been very busy this year with an application for re-accreditation with the ASAR. This has meant quite a few improvements to the Syllabi and the Handbooks. Many thanks to all those who have had a part in this process, particularly Margo Gill, Bonita Anderson and Lucia Pemble. Marie Cawood is responsible for memberships and is the DDU Co-ordinator. Marie is also very likely to be the voice on the other end of the telephone when you call the office.

The ASUM 2002 Scientific Meeting was very successful and has helped to provide funding for some new projects for

research and the on-line reference facility which I mentioned earlier. The ASUM 2003 Scientific Meeting is to be held in Perth. This is a chance for all you East Coasters to have a (partially) tax deductible holiday at a lovely destination, so get hold of a registration brochure and make those holiday plans. I would also like to thank all the staff at ICMS Pty Ltd who helped with the organization of the ASUM 2002 Scientific Meeting and are also involved with the Perth meeting. They have fitted in well and taken our advice on those matters in which we have experience and given us advice on those matters in which we lack experience. A good team effort. We will be holding the second Multidisciplinary Workshop (MDW) in Queensland in 2004 in conjunction with the Obstetrics and Gynecology Symposium. This is to be held at Conrad Jupiters on the Gold Coast. Jupiters did an excellent job of hosting the Scientific Meeting so I am confident of the success of the 2004 MDW.



Mrs Roslyn Savage

I have found being more closely involved, on the Executive Committee, in the administration of ASUM, a very rewarding experience. It has provided me with an opportunity to work with some very talented and dedicated professionals and to see the fruits of our labour. For the Society to flourish, we need more of you to take an active interest in either the State Branch or in one of the many committees which do all the behind the scenes work to look after your interests. So next time you see those forms calling for applications for State Branch committees or council, think about filling one out and offering to become involved. If you are a bit reticent to do it alone, ask a friend to join with you or write up an interesting case for the Bulletin. I am sure you will find it most rewarding.

**Roslyn Savage DMU AMS
Honorary Secretary**

President's Report cont'd from page 2

Honorary Secretary are indeed very much appreciated.

I would like to thank all of the members of our office staff in particular Dr Caroline Hong who has led the staff with great distinction in the last year. The excellent overall position of the Society is in no small part due to Caroline's efforts.

Finally to the membership of the Society, my sincere thanks. All of our activities require the donation of time and expertise from so many of our members. There are times of course when it all seems like a fairly thankless task however many in our Society greatly appreciate the efforts of their colleagues in supporting our activities.

Finally I must thank my wife Sophie and our children for their forbearance and tolerance.

Best wishes

**Dr Glenn McNally MBBS MRCOG FRANZCOG DDU COGU
President**

Hon Treasurer's Report cont'd from page 4

(\$50,000) and to the Research and Development Programme (\$100,000) from its proceeds.

Also I would like to report on the great success of the ASUM Multidisciplinary Workshop, held in Sydney, in both scientific and financial terms.

Approximately \$45,000 has been spent on the development of an online education handbook (Ultrasound Article Library, UAL) for ASUM members to be released shortly, when approved by Council.

As Treasurer I am confident that the Society is in a sound financial situation and is in a good position to utilise more in its resources into furthering ultrasound research and education in Australia, New Zealand and overseas.

**Dave Carpenter MEngSci PhD FAIUM FIEAust FIREE
Honorary Treasurer**

The functions of ASUM committees

The activities of ASUM are initiated by and co-ordinated through its committees. Members are encouraged to raise issues and offer suggestions to any of the committees. These include:

EXECUTIVE COMMITTEE

The Executive Committee includes the President, President Elect or Past President, Honorary Secretary, Honorary Treasurer. There must be at least one medical member and one sonographer member. It deals with ASUM business between Council meetings. The current members of the Executive Committee are:

Chairman

President - Dr Glenn McNally

Committee

Immediate Past President - Dr Stan Barnett
Honorary Secretary - Ms Roslyn Savage
Honorary Treasurer - Dr Dave Carpenter

DDU DEVELOPMENT AND MEDICAL AFFAIRS COMMITTEE

This committee is a subcommittee of Council with specific responsibility for addressing any issue relating to the Diploma of Diagnostic Ultrasound Examination and any scientific, educational or professional issues in relation to medical practitioner members. The current members are:

Chairman

Dr Matthew Andrews

Committee

Dr Roger Davies
Dr Charles Fisher
Dr Glenn McNally
Dr David Rogers

DMU ADVISORY AND SONOGRAPHER AFFAIRS COMMITTEE

This committee is a subcommittee of Council with specific responsibility for addressing issues relating to the Diploma of Medical Ultrasonography and any scientific, educational or professional issues relating to sonographer members. The current members are:

Chairman

Ms Janine Horton

Committee

Ms Bonita Anderson
Mr Stephen Bird
Ms Sue Davies
Mrs Margo Gill
Ms Lucia Pemble
Dr Fergus Scott

FINANCE COMMITTEE

This Committee has the responsibility of overseeing the Society's annual budgets and investment strategies. The current members of the Finance Committee are:

Chairman

President - Dr Glenn McNally

Committee

Immediate Past President - Dr Stan Barnett
Honorary Secretary - Ms Roslyn Savage
Honorary Treasurer - Dr Dave Carpenter

DIPLOMA EXAMINATION BOARDS

The DDU and DMU Boards set and oversee examinations to set standards in competence. The current Board Members are:

Diploma of Diagnostic Ultrasound

Chairman

Dr Chris Wriedt

Board of Examiners

Dr Dave Carpenter
Dr Barry Chatterton
Dr John Crozier
Dr Jack Federman
Dr Jack Jellins
Dr Simon Meagher
Dr Robert Robertson
Dr Peter Warren (resigned with effect from 6 Sept 2003)
Dr Susie Woodward
President - Dr Glenn McNally
Honorary Secretary - Mrs Roslyn Savage

Diploma of Medical Ultrasonography

Chairman

Ms Roslyn Savage - Honorary Secretary

Board of Examiners

Dr Lucia Pemble
Dr Christopher Choong
Mr Mike Dadd
Mr Roger Gent
Miss Rebecca Hetherington
Dr Denise Ladwig
Ms Louise Morris
Mrs Naomi Rasmussen
Mr Christopher Sykes
Mrs Catherine West
President - Dr Glenn McNally

EDUCATION COMMITTEE

The role of the Education Committee is to co-ordinate educational resources so that teaching and professional development is available to students pursuing ultrasound qualifications and to members undertaking continuing medical education. A professional standard of education will ensure maintenance of high quality medical ultrasound practice in Australia and New Zealand. The Education Committee also oversees preparation for major meetings. The current members of the Education Committee are:

Chairman

Dr David Rogers

Committee

Dr Dave Carpenter

Ms Sue Davies

Ms Lucia Pemble

RESEARCH AND GRANTS COMMITTEE

This committee is set up to identify any achievable research projects to promote the highest possible standards of medical ultrasound practice in Australia and New Zealand. The current members are:

Chairman

Dr Roger Davies

Committee

Dr Dave Carpenter

Ms Janine Horton

SAFETY AND STANDARDS OF PRACTICE COMMITTEE

The Safety and Standards of Practice Committee is responsible to Council for:

- providing authoritative information to the membership of the ASUM and the Australian Government and public on the safety of ultrasound applications in medicine. Responsibilities include evaluation of the scientific literature and dissemination of information through publications, presentations at conferences and educational forums, and responses to enquiries. Members of the Committee maintain current knowledge by their active involvement in scientific and clinical research and participation in international research committees on bioeffects and safety.
- setting standards and guidelines in diagnostic ultrasound including many policies and statements intended as guides for practitioners. The Committee's goal is to provide guidelines for the performance of ultrasound in its various fields so that a standard of excellence can be achieved.

The current members of the Safety and Standards of Practice Committee are:

Chairman

Dr Stan Barnett

Committee

Mr Stephen Bird

Dr Dave Carpenter

Prof Marsh Edwards

Dr George Kossoff

Standards of Practice Expert Liaison

Dr Cheryl Bass

ASUM Prize Winners in 2002

Congratulations to the following winners:

GE Chris Kohlenberg Teaching Fellowship
Andrew McLennan, Cheryl Bass

GE Beresford Buttery Overseas Traineeship
Stanley Ng

Toshiba Giulia Franco Scholarship for New Presenters
Lisa Clarke

Philips Best Sonographer Research Presentation Award
Martin Necas

Acuson a Siemens Company Best Research Presentation Award
Hans Peter Dietz

Acuson a Siemens Company Best Clinical Presentation Award
Andrea Gibb

Toshiba ASUM Annual Scientific Meeting Scholarships
Hans Peter Dietz and Lorna Hardiman



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BRANCH COMMITTEES

The Branch Committees organise educational meetings, courses and workshops at Branch level and negotiate with Government and tertiary institutions on relevant issues.

ACT BRANCH**Chairman**

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 Jane Fonda (resigned with effect from 6 September 2003)

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QUEENSLAND BRANCH**Chairman**

to be appointed

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Education Committee

The main project of each Education committee for the last two years has been the development of the online ultrasound clinical handbook. This project aims to provide a clinically relevant online resource to help ultrasound practitioners during their clinical practice. The clinical handbook aims to provide a resource of relevant information, general references, and images. Considerable time and effort has been invested in producing the appropriate structure for an online database. The database has been professionally developed.

The online handbook enables online contribution, and member participation is now being solicited widely to fill the topics that are listed on the database. A beta version is now available online for those contributing to the database and sections are rapidly filling with information. Each section has a content editor who will authorize the delivery of content to the database.

The online ultrasound clinical handbook will be presented at the annual scientific meeting in Perth. It will be in development form for the next six months with the targeted date for general release in March 2004. The handbook will initially be freely available, but access may be restricted as a member benefit after some time. The Education committee wishes to thank all contributors to the project who have put in a great deal of work so far.

The image database CD-ROM has been a successful project over the last four years. The images contained in the CDs produced so far will be incorporated into the online ultrasound clinical handbook together with much additional material currently being prepared.

A major initiative of the Education committee this year was the combining of multiple small workshops into a single multidisciplinary workshop in March in Sydney. This was a large undertaking, mainly coordinated by Keith Henderson. The format seemed popular and most enjoyed the varied nature of the content. Thanks is extended to all contributors. A further multidisciplinary workshop is planned in Brisbane in March 2004.

With the cooperation of the DMU Board of Examiners the education team at Head Office is planning the further development of DMU Preparation programs including online resources. The online ultrasound clinical handbook may well be a significant resource in this program.

These developments in no way detract from the maintenance of the established educational programs and resources. For a comprehensive listing of the Educational Activities of the Society I recommend that you read the "Member Services" section of this Annual Report.

Dr David Rogers MBChB FRANZCR
Chair, Education Committee

Diploma of Medical Ultrasonography

2003 has been a very busy year for ASUM and the DMU Board of Examiners. In particular, I am grateful to the ASUM DMU Coordinator, James Hamilton for his dedication and support to the DMU Board of Examiners on all DMU matters. By far the largest project undertaken this year by the DMU Board of Examiners has been the preparation of the ASAR re-accreditation documents. Margo Gill was asked to help in this mammoth task and her professionalism and expert knowledge in matters of accreditation have made a daunting task possible. Margo's drive and efficiency is greatly appreciated.

In response to suggestions from the Sonographers' Affairs and DMU Advisory Committee, and to satisfy the ASAR re-accreditation requirements the Board of Examiners has made changes to the syllabi, reading lists and examination handbooks. Although it has been time consuming I feel it is well worth our time to present a professional document. We have made some major changes. The changes include re-introducing an oral component to the DMU Part II Examination, voluntary submissions of case studies to facilitate feedback, standardising the number and type of case study presented at the practical examinations and a selection and training process for volunteer examiners.

In order to satisfy the ASAR registration requirements for Australian candidates wishing to gain Student Status, the deadline for DMU applications has been brought forward to the end of January in 2004 allowing students to be registered as a DMU candidate and register with ASAR as students.

Much of the most recent Board of Examiners meeting was occupied with updating the question database continuing the excellent work of previous Examination Boards. Because

of the changing nature of sonography technology we plan to continue updating the database to include any new sections in the syllabi.

The number of DMU Part I candidates has changed from 171 in 2002 to 134 in 2003. This is most likely in response to the growing number of university courses now available. Many of these courses now allow for distance education providing an option for candidates in remote areas who previously had no real options other than the DMU Examination. The number of DMU Part II candidates has increased this year from 111 in 2002 to 131 in 2003. A considerable number of these candidates are Cardiac candidates who now have an optional course at least at QUT. Another source of DMU candidates has been older radiographers who do not have qualifications to satisfy the entry requirements to many of the university courses. As time goes by there will also be a dwindling number of people in this category. In the future we may need to provide for even more remote students wanting to sit the DMU Examinations. Already there has been discussion about having some sort of examination for people in South East Asia.

There have been many changes to the examinations and the people working on the Board of Examiners. It will take a little time for all the changes to be accepted and for the new members on the Board of Examiners to "find their feet" (myself included) but I am certain that we have done some excellent groundwork for the DMU to be more cost effective and easier to administer in the future.

Roslyn Savage DMU AMS
Chair, DMU Board of Examiners

DDU Development and Medical Affairs Committee



Dr Matthew Andrews

In 2003 two general issues were considered by the DDU Development and Medical Affairs Committee:

1. ASUM is receiving requests from multiple medical craft groups who are utilizing ultrasound for access to a medical ultrasound qualification, which covers their individual types of ultrasound practice. It is recognized that the Diploma of Diagnostic Ultrasound (DDU) in its current format provides qualification in a much wider field of ultrasound than many medical groups practice. ASUM has therefore decided to explore the possibility of providing modules of ultrasound qualification, which, if adopted, will enable medical

practitioners to qualify for their specific fields of practice. A common qualification relating to physics and instrumentation, based on the current DDU Part 1 would be a compulsory component for all candidates.

2. ASUM is strongly supportive of expanding overseas by offering guidance and helping to formulate examinations and also to consider being part of the examination process as examiners. It is felt this will raise ASUM's profile by providing its expertise to a wider audience. It is planned that this would take the form of a completely separate exam to the DDU and should have a distinctive designation.

Matthew Andrews MMBS (Hons) MMed FRANZCR
Chair, DDU Development and Medical Affairs Committee

Diploma of Diagnostic Ultrasound



Dr Chris Wriedt

The current DDU examination candidates number 40 to sit for Part 1 and 19 to sit for Part 2.

The written portion of the Part 1 and Part 2 examinations will be held on Monday 19 May 2003 at the following locations: Sydney, Melbourne, Perth and Auckland New Zealand.

The viva (oral) portion of the Part 2 examination for cardiology candidates only was held in Melbourne on Thursday 12 June 2003. The viva (oral) portion of the Part 2 examination for all other candidates was held in Sydney on Saturday 14 June 2003.

Candidate numbers are similar to last year but the number of the craft groups that are interested in the examination is

increasing. This is pleasing and I feel reflects the increasing realisation of the importance of the modality to a wide range of clinical applications.

The standard of candidates remains variable but there is a general tendency for increasing of the standard.

The Examination Board is continuously reviewing the exam structure and changing it to reflect modern standards of examination. One of the changes instituted has been in the viva examination marking, where an extensive written qualitative commentary is made on each candidate as well as their raw score mark.

I would like to thank all of the Board of Examiners and our Secretariat for their undying efforts in allowing the exam to be organised and conducted in a successful way.

Chris Wriedt MBBS FRANZCR FRCR DDU
Chair, DDU Board of Examiners

DMU Advisory and Sonographer Affairs Committee

The past year has been an interesting and productive one for the DMU. The main focus over this time has been the investment of time by many people in compiling the ASUM submission to the Australian Sonographers Accreditation Registry for the DMU. I wish to thank all involved as this has been a long and arduous task but most of all Margo Gill for her untiring efforts. This document has now been finalised and is with the ASAR for formalisation of its accreditation. Some of the areas that made it difficult for us to achieve full accreditation during the last application included absence of feedback to candidates, lack of

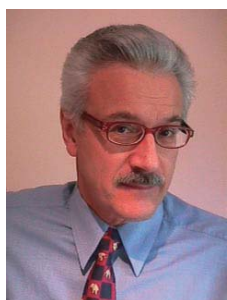
structured course work and assessment process. With this application we have attempted to address these. Many thanks must go to the DMU Exam Board for their dedication and efforts. This has been a time consuming job but that will bring a greater understanding of the DMU for the candidates and the ASAR. The DMU is an important foundation for ASUM. These changes allow the DMU to move towards the future and the changing needs of the constituents. Ultrasound has always been and will always be a dynamic modality that is becoming a major core component of Radiology, therefore the examinations should

also be a dynamic entity. The DMU handbooks are now available online and forms printed from these will be acceptable applications for the part 1 & 2 DMU exams. Results will be available online to alleviate the waiting time between ratification and notification. Written results will also be sent out. Costs of sitting for the DMU has now been 'broken down' so candidates have the option of paying for all three or just for parts of the exam. The website has been upgraded by the education staff and will provide increasing access for ongoing education, both for qualified Sonographers and also for DMU candidates. This will have a great impact on the ability of these candidates to access knowledge and learning centres as they proceed towards their exams. The regulations, where necessary, have been changed to reflect the new direction that the DMU will follow.

Head office of ASUM supports the ongoing growth of the DMU, without which the momentum would fail, and provides the hub of the operation with all financial and office support stemming from there. They also provide budgetary and standardisation controls that allow for accountability within this area. The effect brought about by changes includes budget restraints and ensuring reducible costs are constantly being sought and implemented. ASUM is considering the possibility of an extension of a qualification to overseas candidates. The foundation of this has already been laid with the Asia link now strongly enconced as part of our culture.

Janine Horton DMU DAppSc
Chair DMU Advisory and Sonographic Affairs Committee

Safety and Standards of Practice Committee



Dr Stan Barnett

The ASUM Safety and Standards of Practice Committee maintained a pro-active role in evaluating the current scientific database and preparing updated guidelines for the safe use of diagnostic ultrasound in medicine. International liaisons were maintained with other ultrasound societies and organisations including the WFUMB, AIUM and the International Perinatal Doppler Society. Through these international

professional linkages, the ASUM Safety and Standards of Practice Committee is kept up to date with latest developments in research and international standards.

The main goal is to increase the visibility of the Committee to ensure that all members are aware of the service provided by it. Articles on current issues and tutorial papers are published in the *Ultrasound Bulletin* and on the ASUM website. The Safety Committee will continue to liaise with international societies and will continue to have input into the processes leading to the formation of international standards for medical ultrasound. As the safe and effective use of ultrasound in medicine is a global issue, information about other international ultrasound societies will also be made available. Policy matters relating to safety, including guidelines for use, are published on the ASUM website.

ASUM policy on the use of live models for scanning demonstrations at annual scientific meetings is under review.

Stan Barnett PhD
Chairman, Safety Committee

STANDARDS OF PRACTICE

Standards of practice has been quiet this year, too quiet in fact. The main queries coming through continue to be on the topic of probe sterilization. Finally the Infection Control in a Health Care Setting has been promulgated. This in turn allows us to formally review our policy in this area. Following a submission by ASUM to the committee in charge of the Infection Control in a Health Care Setting they altered

their stance on sodium hypochlorite as a sterilant for transvaginal probes. Instead of banning Milton outright, the document now states that hypochlorite is not acceptable for use as there is none TGA approved. The paradox is that sodium hypochlorite is partially effective against and recommended for situations where CJD is a possibility and more stringent procedures cannot be used. Aldehydes in contrast are ineffective against CJD. So where does that leave us? Fortunately alternatives to carcinogenic solutions are becoming commercially available.



Dr Cheryl Bass

In the forthcoming year ASUM needs not only to revise its guidelines for disinfection of transvaginal transducers but will also have to revisit most policies. Although it may only seem like yesterday to those hard working members who were involved with the last revision, three years have passed. We need to review our policies and ensure they continue to reflect best practice and update them as necessary. I have my eye on the First Trimester policy as ASUM still receives e-mails about the nuchal translucency component, mainly suggesting that it should be more rigorous. Furthermore we still do not have consensus on the Obstetric charts. I am particularly pleased with the establishment of an OH&S guideline. Val Gregory is to be commended for her considerable input into this document which has been well received by the community. A new guideline being considered concerns gender issues in our speciality.

In this time of increasing technological advances and subspecialisation and taking into account the vast variably populated country that we live in, the challenge is to continue to make policy that is practical, useful and able to be adhered to by the vast majority of practicing sonographers and sonologists.

Cheryl Bass MBChB MRCP(UK) RANZCR
Standards of Practice Committee Expert Liaison

MEMBER SERVICES

WEBSITE <http://www.asum.com.au>

The ASUM website is being developed as an educational portal from which members can access a range of international learning resources in addition to those developed by ASUM. It is the first port of call for information about ASUM and its services. ASUM's website is a public site, but access to certain sections is restricted to members. The website includes a noticeboard, and sections that provide information about ASUM, the calendar, policies and statements, meetings, education, the DMU, the *Ultrasound Bulletin*, educational resources, employment services and MOSIPP. Printable registration forms are available on-line for most ASUM meetings. The employment services section is a public site but advertising on this site is a free service to members only. Members participating in the MOSIPP program can enter their own data on-line using the MOSIPP Diary and Handbook section.

New features available in late 2003 will include an Online Clinical Handbook and the facility for members to change their address details.

Contact Jenny Macklin Ph: 61 2 9958 6200, Fax 61 2 9958 8002, education@asum.com.au

ANNUAL SCIENTIFIC MEETING

The Annual Scientific Meeting is hosted, in turn, by most branches of ASUM. Internationally recognised speakers are carefully selected to ensure that members are exposed to information about current developments in ultrasound, and invitations are issued to those who wish to proffer papers and posters. The Annual Scientific Meeting is well-supported by the trade with a comprehensive display of current technology and specialist staff.

MOSIPP

MOSIPP is ASUM's continuing professional development program. It is a diary-based program, which recognises the learning activities that members choose to undertake in order to maintain professional competence. All members are eligible to participate in the MOSIPP program. Accredited Medical Sonographers can use MOSIPP to satisfy all CPD requirements of the ASAR.

Contact Jenny Macklin Ph: 61 2 9958 6200, Fax 61 2 9958 8002, education@asum.com.au

ULTRASOUND BULLETIN

The *Ultrasound Bulletin* is issued quarterly. The first issue was published in February 1998. The content includes review articles, original research, technical features, case reports, book reviews and other educational material. The *Ultrasound Bulletin* provides an excellent opportunity for the publication of work relating to the practice of medical ultrasound.

The *Ultrasound Bulletin* is ASUM's official publication and carries notices of decisions of the Council with respect to the policies and activities of the society, as well as the positions adopted by the policy in relation to events which impact on the practice of Medical Ultrasound.

Contact The Editor, Ph 61 2 9958 6200, Fax 61 2 9958 8002, editor@asum.com.au

EDUCATION RESOURCES

The "ASUM Image Database" is an ever-growing library of examples and teaching cases designed for members to use as reference set, and as a resource for teaching. Two CDs were issued free to all members in 2001 and 2002. These, together with additional material will be published online in 2003.

CD Roms

Anna Parsons Lecture Series. Titles: Endometrial Assessment, Chronic Pelvic Pain, Sonographic Workup of Premenopausal Bleeding, Ultrasound of the Uterus and Ovary in Postmenopausal women, Ultrasound and Infertility (including tubal assessment).

An Introduction to Diagnostic Ultrasound. An interactive learning program on the Physics and Instrumentation of Diagnostic Ultrasound.

Posters

The 18-20 Week Obstetric Ultrasound Examination. The collection of images and information on this poster is intended to reflect the Australasian Society for Ultrasound in Medicine guidelines for the 18-20 week obstetric ultrasound examination.

A Transthoracic Echocardiographic Protocol for the Non-invasive Cardiovascular Laboratory. This poster is designed as a teaching resource and a starting point from which echocardiographic examinations can be extended to test clinical hypotheses or evaluate suspected pathologies during examination.

Dynamic Transperineal Sonography: Detection of Pelvic Floor Pathology. This poster describes a non invasive ultrasound technique which may enhance, or in some practices provide an alternative to the traditional methods of imaging pelvic floor dynamics.

Videotapes

The 18-20 Week Obstetric Ultrasound Examination, by Katherine Devonald and David Ellwood. This educational video program describes and illustrates the guidelines recommended by the Australasian Society for Ultrasound in Medicine when performing an Obstetric Ultrasound scan in the mid trimester of pregnancy.

High Resolution Breast Ultrasound: A Toshiba Initiative for better Education, by Jack Jellins, 1996 (Image Teaching Technologies). An educational videotape of real-time breast ultrasound which illustrates: Imaging Principles, Examination Techniques, Interventional Procedures, Normal Anatomy, Benign Conditions, and Malignant Conditions.

Videotape Library

View our selection of over 100 videos for hire on line at www.asum.com.au and follow the links from "Education".

CALENDAR OF ULTRASOUND EVENTS

A comprehensive calendar of branch, federal and international meetings related to ultrasound is published on ASUM's website and in the *Ultrasound Bulletin*. The calendar is updated monthly on the website and with each issue of the *Ultrasound Bulletin*.

Contact Jenny Macklin Ph: 61 2 9958 6200, Fax 61 2 9958 8002, education@asum.com.au

DMU PREPARATION COURSES AND DDU PHYSICS SEMINARS

Courses are held annually in February to assist candidates in their examination preparation. Details of these courses are published in the *Ultrasound Bulletin* and on the website 6 months prior to the courses. Additional physics seminars are also conducted in various centres. Some branches conduct series of seminars designed to assist examination candidates.

Contact Jenny Macklin Ph: 61 2 9958 6200, Fax 61 2 9958 8002, education@asum.com.au

CHRIS KOHLENBERG TEACHING FELLOWSHIPS

The Chris Kohlenberg Teaching Fellowships (Sponsored by Diasonics GE) were established to increase the educational opportunities for members outside the major centres. The teaching fellow is appointed by the education committee to conduct workshops and seminars primarily, but not exclusively, in centres that would not normally host a major scientific meeting. Since its establishment in 1998, the fellowship has sponsored meetings in New Zealand, Queensland, New South Wales, the Northern Territory, Western Australia, South Australia, Victoria and Tasmania. Two teaching fellowships are available in each year.

Contact Jenny Macklin Ph: 61 2 9958 6200, Fax 61 2 9958 8002, education@asum.com.au

BERESFORD BUTTERY OVERSEAS TRAINEESHIP

The Beresford BATTERY Overseas Traineeship (Sponsored by GE) covers 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 4 days). The award is made to a member

who seeks to further develop his or her skills and experience in obstetric and gynaecological ultrasound and has, as a minimum qualification Part I of the DDU or DMU (or equivalent) or have been awarded the DDU or DMU (or equivalent) within the last 5 years since 21 December 1996). The award is made by the committee to the applicant judged to be most closely fitting the published criteria, on the basis of material submitted by the applicant.

Contact Jenny Macklin Ph: 61 2 9958 6200, Fax 61 2 9958 8002, education@asum.com.au

PATIENT INFORMATION LEAFLETS

Short publications entitled "About Your Ultrasound Examination" addressing often-asked questions are available on the following topics: Abdomen, Gynaecology, Obstetrics, and Vascular Doppler. Order forms for these are available on our website or by contacting: Marie Cawood, Ph: 61 2 9958 7655, Fax: 61 2 9958 8002, mcawood@asum.com.au

POLICIES AND STATEMENTS

ASUM's Policies and Statements are published on the website at <http://www.asum.com.au> ASUM regularly reviews policies and statements and publishes changes in the ASUM *Ultrasound Bulletin*.

PROFESSIONAL INDEMNITY INSURANCE

Optional professional indemnity insurance is available for sonographer members and Associate members. This insurance is arranged through AON Professional Services using Royal and Sun Alliance Insurance Australia. Cover is provided to a limit of \$1 million for a single claim at a current premium of \$353 per year. The policy is a "claims made" type which covers for claims made against the insured and reported to the underwriters during the policy period, and covers professional practice in Australia, New Zealand and Papua New Guinea. It includes run-off cover to protect sonographers no longer in practice who were covered immediately prior to their retirement. Automatic policy extensions include libel and slander, loss of documents, dishonesty of employees, trade practices act and related legislation, one automatic reinstatement, unlimited retroactive date, intellectual property, public liability-\$5,000,000, continuous cover, joint venture liability, inquiry cost up to \$100,000, emergency first aid, teachers liability, fidelity - \$50,000. Enquiries should be directed to AON Professional Services, 63 Pirie Street, Adelaide SA 5000 Ph: 61 8 8301 1111

Past Presidents

1970-1972	George Kossoff	1986-1987	Frederick Lomas
1972-1974	William Garrett	1987-1988	Beresford Buttery
1974-1976	David Robinson	1988-1989	Peter Duffy
1976-1977	Herbert Hughes	1989-1990	Garry Lequesne
1977-1979	Michael Dadd	1990-1991	Robert Gill
1979-1980	Ian McDonald	1991-1992	Beverley Barraclough
1980-1981	Peter Verco	1992-1994	Lachlan de Crespigny
1981-1982	David Carpenter	1994-1996	Peter Warren
1982-1983	John McCaffrey	1996-1998	Susie Woodward
1983-1984	James Ryan	1998-2000	Andrew Ngu
1984-1985	Thomas Reeve	2000-2002	Stan Barnett
1985-1986	Stan Reid		

Life Members

1991	Dr William Garrett	1994	Dr Stan Reid
1991	Dr Peter Verco (deceased 1999)	1995	Dr David Robinson
1992	Dr George Kossoff	1999	Mr Mike Dadd
1992	Mrs Margaret Tabrett	2001	Dr James Syme
1993	Prof Thomas Reeve	2002	Miss Judith (Pru) Pratten (deceased 2002)
1993	Dr John Stewart		

Honorary Members

1980	Japan	Dr Toshio Wagai	1989	Denmark	Dr Soren Hancke
1985	Denmark	Dr Hans Holm	1989	UK	Prof Peter Wells
1985	Croatia	Prof Asim Kurjak	1990	Germany	Dr Harald Lutz
1985	USA	Dr George Leopold	1991	Canada	Prof Peter Burns
1988	Japan	Dr Hiroki Watanabe	1998	USA	Dr Barry Goldberg
1988	USA	Dr Marvin Ziskin	2001	Thailand	Dr Kittipong Vairojanavong

Honorary Fellows

2002	Australia	Dr Andrew Ngu
2002	Australia	Mrs Kaye Griffiths

Corporate Members

Agfa-Gevaert Ltd (*Scopix, Matrix Images, Digital Memories*)
David Chambers 03 9264 7711

Aloka/SonoSite (*InSight Oceania*)
John Walstab 1800 228 118

Australian Medical Couches (*Couch Manufacturer*)
Marcus Egli 03 9589 3242

Bambach Saddle Seat Pty Ltd
Sue Johnston 02 9939 8325

Bristol-Myers Squibb Medical Imaging (*Ultrasound Contrast & Nuclear Imaging Agents*)
Wayne Melville 02 9701 9108 mobile 0409 985 011

Central Data Networks P/L (*CDN. Affordable PACS & Medical Imaging Networks*)
Robert Zanier 1300 722 632 mobile 0407 069 307

Excelray Australia Pty Ltd (*Medical Imaging Solutions*)
David George 02 9888 1000

GE Medical Systems Ultrasound
Trisha Cornwell 02 9846 4658

Mayne Health (*Comprehensive Health*)
Darryl Lambert 0412 547 021

Medfin Aust P/L (*Leasing Finance for Medical Practitioners*)
Barry Lanesman 02 9906 2551

Meditron Pty Ltd (*Acoustic Imaging, Dornier, Kontron*)
Michael Fehrmann 03 9879 6200

Peninsular Vascular Diagnostics (*Vascular Ultrasound Educ*)
Claire Johnston 03 9781 5001

Philips Medical Systems Australasia P/L (*incorporating formerly ATL, HP, Agilent*)
Shelley Burnside 02 9947 0100

Rentworks Ltd (*Medical Leasing Equipment*)
Don Hardman 02 9937 1074

Schering Pty Ltd (*Ethical Pharmaceuticals*)
John Peace 02 9317 8666

Siemens Ultrasound (*Acuson*)
Debbie Myers 03 9804 4034

Toshiba (Aust) P/L Medical Division (*Toshiba*)
Angela Doubleday 02 9887 8025

Key issues in the analysis of safety of diagnostic ultrasound

Stanley B Barnett MSc PhD FAIUM; Immediate Past-President, ASUM; Honorary Secretary, WFUMB; Chair, Safety Committee of ASUM and WFUMB

SUMMARY POINTS

- *Diagnostic ultrasound has a good safety record compared with other imaging modalities.*
- *Modern ultrasound diagnostic equipment can produce measurable biological effects, however the clinical significance of some is uncertain.*
- *Pulsed Doppler exposures can produce significant heating in the fetus, particularly near bone when the ultrasound beam is fixed onto a single point tissue target.*
- *Clinical implications of non-thermal effects are not fully evaluated.*
- *Human studies do not give convincing evidence of adverse effects, but there are significant gaps in current knowledge. Although there are occasional sensational media reports, the balance of evidence gives no cause for concern when diagnostic ultrasound is used according to proper guidelines with an anticipated medical benefit.*
- *Gas-encapsulated echo-contrast agents increase the likelihood of acoustic cavitation in acoustic fields and their use in perinatal applications significantly increases risk.*

IS THERE REASON FOR CONCERN?

Diagnostic ultrasound is generally accepted as a safe procedure in the absence of plausible and confirmed evidence of adverse health effects. However, it is impossible to completely eliminate the possibility of adverse effects as the scientific database is incomplete and cannot keep pace with technological development in modern equipment. Users of modern sophisticated ultrasonographic equipment are responsible for risk/benefit assessment.

This paper presents a summary of the key issues relating to bioeffects and safety of diagnostic ultrasound. For more detailed information on the topics addressed, please refer to the references cited or to relevant recently published books^{1,2}.

Whilst there may be no serious cause for concern for most applications, the prudent use of ultrasound is justified. Obstetric applications are particularly susceptible as rapidly dividing and differentiating embryonic and fetal tissue is sensitive to physical damage and the result of perturbation of cell differentiation may result in significant consequences. Technological developments have brought about improved diagnostic acuity, but have also been accompanied by substantially increased levels of acoustic output^{3,4}. Whilst acoustic outputs from diagnostic devices have increased substantially in the past decade, there have been no human studies on possible health effects from such exposures.

Furthermore, the FDA upper limit on intensity has been relaxed for obstetric examinations (allowing almost eight times higher intensity to the embryo or fetus) on the basis that the user will be guided on thermal risk by the equipment's display of the thermal index (TI). However, the

TI is not regulated, only the Ispta intensity. This parameter is not affected by change in acoustic frequency but the rate of acoustic absorption (and resulting temperature rise in tissue) increases with increasing frequency. Modern ultrasound equipment combines a range of frequencies in complex scan modes to increase diagnostic accuracy. Change to higher frequencies, while complying with FDA limit on intensity, could significantly increase the ultrasound-induced temperature in embryonic tissue. Ultrasound output from modern diagnostic devices can produce measurable and significant biological effects through both thermal and non-thermal mechanisms^{1,2,5}. The real issue is whether, or not, they translate to adverse health risk.

Meanwhile, in the enthusiasm to find new applications, clinical studies have been published on spectral Doppler flow measurements of yolk sac in early 1st trimester, while the benefit or potential risk is not established. There are no data from human studies on which to conclude the application is without risk. On the other hand, misdiagnosis is a real risk to the patient and there is a need to establish the clinical benefit of procedures such as Doppler flow embryo-sonography. Unregulated use of freely available and inexpensive equipment by non-accredited or inadequately trained individuals presents an increased risk of misdiagnosis and harm.

ULTRASOUND HEATS TISSUES

In obstetrics scanning the amount of ultrasound-induced heating of the fetus correlates with gestational age and increasing mineralisation of bone. Due to its particularly high acoustic absorption characteristics, bone is rapidly heated when placed in the path of an ultrasound beam. Significant increases in temperature have been consistently recorded when the pulsed Doppler ultrasound beam encounters bone either in transcranial or in fetal exposures. However, there is no risk of adverse heating effects from simple B-mode ultrasound scanning procedures that use scanned beams. Diagnostic ultrasound produces a modest temperature increase in soft embryonic tissue and is unlikely to be a major safety concern, from thermal considerations, for first trimester ultrasonography.

The greatest heating effect is usually associated with the use of pulsed spectral Doppler ultrasound applications where a stationary beam of relatively high intensity is directed at a single tissue target. As a result, tissue near bone can be heated to around 5°C [e.g. 4.5°C measured in the brain of animal fetuses insonated *in utero*⁶, or equipment output displayed at maximum TI=6]. Based on such data, the World Federation for Ultrasound in Medicine and Biology cautions that significant temperature increase can be produced by pulsed Doppler exposures, particularly near to bone, and recommends⁷ that:

Key issues in the analysis of safety of diagnostic ultrasound

"A diagnostic exposure that elevates embryonic and fetal in situ temperature above 41°C (4°C above normal temperature) for 5 min or more should be considered potentially hazardous."

There is some evidence to suggest that ultrasound-induced bioeffects can be enhanced by modest increases in temperature. Studies on embryonic development using a novel test-tube culture process that allowed interaction with carefully characterised ultrasound fields and temperature^{8,9}. Rat embryos were grown and insonated in test tubes to avoid the effects of maternal physiology. The results of this study clearly demonstrated severe abnormalities in brain development at high ultrasound exposures. However, at levels equivalent to diagnostic pulsed Doppler applications there was no measurable adverse effect as long as temperature did not increase. A mild elevation of 1.5°C above normal together with ultrasound exposure for 15 minutes caused retarded brain growth and increased synthesis of heat shock (stress) proteins. There may be an increased risk to febrile patients from hyperthermic damage, since their elevated core temperature would add to the ultrasound-induced heating of the embryo or fetus. In all ultrasound applications thermally induced adverse effects can be avoided by minimising TI and duration of exposure.

NON-THERMAL STRESSES

Acoustic inertial cavitation is a non-thermal phenomenon that involves collapse of bubbles in liquid in a sound field and the sudden release of energy that can be sufficiently intense to disrupt molecular bonds. The released chemically-reactive free-radicals have the potential to interfere with DNA and cause chromosomal damage. Although this effect has been reported in contrived laboratory studies at high intensities, it has not been directly observed in patients or in animals exposed to diagnostic intensities.

During the past decade a number of studies reported ultrasound-induced haemorrhagic lesions in tissues of lungs and intestines in mammals following brief exposure to the maximum operating conditions in diagnostic equipment. The effect depends on the presence of a tissue/air interface, suggesting that it is unlikely to have clinical significance to obstetrical ultrasound examinations. Capillary bleeding has been repeatedly demonstrated in lungs of various animal species following exposure to diagnostic ultrasound. The essential condition for this cavitation-related interaction is the presence of tissue/gas boundary interfaces, as occurs at the alveoli surface of the lung. As the onset of cavitation can occur within a diagnostic pulse, these bioeffects have been observed after exposures as brief as 20 seconds¹⁰. There is no evidence of tissue damage in the fetus where the lungs are not normally inflated. In clinical applications, there is a risk of lung hemorrhage in the premature neonate during pulsed Doppler echo-cardiographic examinations. The clinical implications are uncertain, but assumed to be trivial compared with the potential benefit from improved diagnosis that might be obtained for such physiologically compromised neonates.

Radiation pressure causes acoustic streaming of fluid along the path of an ultrasound beam. There is evidence that acoustic streaming occurs in liquid-filled body cavities during exposure to diagnostic ultrasound, particularly when

used in pulsed Doppler mode^{6,11}. However, the effects of its associated shear forces are uncertain. Embryonic tissue does not have the structural strength of the intercellular matrix that develops in later fetal and post-natal life. Thus, the period of embryonic development, particularly during cell differentiation and neuronal cell migration, may be vulnerable to mechanical stress. There is insufficient evidence to determine whether or not the passage of an ultrasound beam could exert sufficient radiation stress to cause permanent displacement of sensitive proliferating cells, for example, in the developing human central nervous system. However, there is some evidence from animal studies that embryonic development can be delayed or disturbed when such shear forces occur in the presence of a modest increase in temperature^{8,9}. The 1.5°C temperature rise needed for these reported effects is within the capability of some modern equipment output. The implication of these findings to embryo-sonology is uncertain, however it does suggest that a cautionary approach is justified. The associated stresses may interact and/or disrupt fragile embryonic tissue elements.

CONTRAST AGENTS ENHANCE BIOEFFECTS

The introduction of gas-stabilised echo-contrast agents into the sound field greatly increases the likelihood of producing cavitation bioeffects⁷ and these have been observed in cells, animals and in humans. A recent study has reported premature ventricular contractions (PVC) in healthy human subjects during triggered harmonic imaging of the heart following injection of an ultrasound contrast agent¹². A commercially available ultrasound imaging device produced a substantial effect (increase in PVC rate by two orders of magnitude) at MI=1.5, i.e. within the limits of FDA approved diagnostic exposure. The issue of arrhythmias in humans and perivascular injury in animals exposed to pulsed ultrasound after administration of contrast agents is succinctly described in recent review article¹³.

The subject of enhanced effects that might be produced when gas encapsulated echo-contrast agents are introduced into the sound field is yet to be fully evaluated. The use of gas-encapsulated echo-contrast materials to enhance sonographic imaging increases the probability of cavitation. Cavitation-related biological effects can be avoided by reducing the peak amplitude, or by using a low value MI (mechanical index) on equipment with an output display. The presence of contrast agents should be taken into account when considering the risk/benefit ratio of an ultrasound examination.

HUMAN STUDIES

Whilst there is no convincing evidence of a causal relationship between ultrasound exposure and adverse health outcome, the scientific literature contains occasional reports of effects that are difficult to explain. Perturbation of neuron migration in 2nd trimester can produce subtle neuro-physiological effects and has been suggested as a possible mechanism for reports of increased incidence of non-right-handedness^{14,15} in boys that were exposed prenatally to diagnostic ultrasound. It is difficult to attribute a responsible ultrasound mechanism from brief clinical exposure to B-mode scanning at the low intensity levels that were used

when ultrasound scans were undertaken approximately two decades ago in these studies.

Developing embryos and fetuses are sensitive to insult by physical agents. Because of the low acoustic absorption properties of soft embryonic tissue in early 1st trimester, it is unlikely that thermally-mediated effects are a major safety consideration, particularly when dwell time is minimized. Non-thermal stresses may become significant by themselves or in combination with mildly elevated temperature, however, there are scant bioeffects data from which to evaluate potential adverse effects of ultrasound exposure of the embryo and early fetus.

Whilst it is comforting that there is no conclusive evidence of serious adverse health effects from prenatal ultrasound exposures, there are obvious limitations and inadequacies in the scientific database. Epidemiologic data are derived from ultrasound exposure levels considerably lower than those available from modern ultrasonographic equipment. There are no data from perinatal applications using spectral or colour flow Doppler, or from other modern ultrasonographic procedures such as harmonic imaging techniques and application of echo-contrast agents.

CONCLUSIONS

Whilst diagnostic ultrasound has a good safety record a cautious approach is justified, particularly in the use of Doppler ultrasound in first trimester pregnancy. Scientific data are incomplete and there are no epidemiologic data for exposures of the type applied in current perinatal applications. With continuing changes in technology and development of new applications its continued use as a safe and effective modality can only be assured if used according to recognised guidelines and by using the lowest exposure necessary to provide essential diagnostic information. Its use for non-medical purposes is professionally inappropriate.

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Live scanning at Annual Scientific Conferences: a new look at ASUM policy

Stanley B Barnett MSc PhD FAIUM; Chair, ASUM Safety Committee; Chair, WFUMB Safety Committee

SUMMARY

This paper reflects the opinions of the author only and is presented as part of the process of reviewing existing ASUM policy on the use of live models, specifically at annual scientific conferences, to display ultrasound equipment. I believe that it is appropriate to adopt a more tolerant and practical approach to the issue, whilst enforcing some specific conditions to ensure the provision of good safety margins.

Analysis of the database on biological effects of diagnostic ultrasound shows that while the upper level of outputs from modern ultrasonographic equipment can produce measurable biological effects in laboratory experiments, the risk of adverse human health effects appears to be low (for detail, see accompanying paper in this issue of the Bulletin). Whilst there is no convincing evidence of human harm from exposure to diagnostic ultrasound, it must be recognised that data from human studies are inadequate. As the developing embryo and fetus are sensitive to damage by ultrasound and heating and the consequences of perturbed fetal development would be far greater than for adult tissue, it makes sense to avoid exposure of the embryo or fetus to ultrasound other than when needed for medically indicated reasons. Clearly, demonstration of equipment at exhibitions is not a medically indicated situation. It is essential that any policy statements on the use of live models for scanning at scientific conferences should be based on clear interpretation of safety issues and not on economic considerations. Given the above, it is not practical to ban all ultrasonographic examination types. Prudent policy would, rather, avoid any of the higher risk categories, while allowing live scanning by other applications under unambiguous practical guidelines. It is suggested that existing policy of prohibition of live scanning by exhibitors be relaxed to allow scanning under strictly specified limited exposure conditions. Such prescriptive policy would deny scanning of children and pregnant women, the use of intracavitary or other invasive procedures and applications involving echo-contrast agents. Acoustic exposure would be limited to equipment displayed output values of $TI < 1.0$, $MI < 1.0$ and examination durations for consecutive periods not exceeding one hour. It is suggested that the requirement for limited exposures will not only help the user apply the ALARA (As Low As Reasonably Achievable) principle to minimize exposure, but will also encourage a better understanding of the practical purpose equipment output regulation. Users will be expected to demonstrate an understanding of bioeffects and safety and the relevance of equipment output display indices. Such a change in existing policy will require cooperation of all parties and necessitate the provision of practical user guidelines in contractual agreements relating to the use of live models for scanning on exhibition space at ASUM annual scientific meetings.

BACKGROUND

Although the practice of using live models to demonstrate ultrasonographic imaging equipment at scientific meetings has gained popularity in recent years, official policy varies amongst different medical conference organisers. Some offer little, or no, restrictions while other ultrasound societies have produced ambiguous policy that is subject to various interpretations. For example, some justify the practice of scanning live models on the basis of an assumed "educational" benefit that is virtually impossible to measure in an objective sense. One issue that has gained universal support is that non-medical use of diagnostic ultrasound should be discouraged. The AIUM has taken a particularly emphatic line and published a statement that this is "contrary to responsible medical practice". However, the definition of "non-medical" versus "educational" application is somewhat less certain. Should the scanning of live models to display equipment on exhibit areas be considered "non-medical", this could have serious implications for prudent policy. While the strict definitions and interpretation of the safety issue remains debatable, the ASUM has maintained a conservative unambiguous policy that prohibits scanning of live models by exhibitors at scientific meetings (A different set of guidelines is published pertaining to training workshops and practical credentialing examinations where hands-on applications are permitted under strict supervision and defined conditions). The prohibited scanning of live models is largely circumvented by exhibitors scanning live models in hotel rooms during ASUM annual scientific meetings.

Perhaps it is time to review existing policy and create a more practical approach that defines certain approved examination types that are considered low risk. Based on consideration of safety issues, it is clear that there are significant differences in risk and potential adverse effect depending on the type of ultrasound examination. On that basis, it is difficult to sustain an argument that a total ban on live scanning is appropriate. By allowing certain lower risk applications and through the provision of clear safety guidelines, a sensible and practical compromise may be achieved, in the best interests of both the ultrasound trade and end-users.

CURRENT POLICIES ON LIVE SCANNING

Existing published ASUM policy on scanning of live models by technical exhibitors during ASUM meetings simply states:

"The scanning of live models or technical exhibitors is NOT permitted in the technical exhibition area, including hotel rooms. Should other registrants scan themselves, they do so at their own risk."

The ASUM Safety Committee is currently revising this guideline taking into account the status of knowledge on

biological effects and safety and the need for adequate safety margins to give a good level of protection against risk when benefit is low or absent. An option may be to allow some low risk examinations under limited ultrasound exposure while prohibiting live scanning of children and pregnant women. The European Federation of Societies for Ultrasound in Medicine and Biology (EFSUMB) has a slightly more lenient approach than existing ASUM policy and allows live scanning, albeit with quite specific exceptions and under strict limits on equipment operating conditions. Under no circumstances is the use of pregnant women as live models permitted at annual scientific congresses; not on exhibit stands, in presentations by manufacturers which are ancillary to the congress, or during scientific and tutorial program of the congress. On the other hand, the International Society for Ultrasound in Obstetrics and Gynecology (ISUOG) has no obvious restriction on the scanning of live pregnant models during its annual conference. Similarly, the World Federation for Ultrasound in Medicine and Biology (WFUMB) makes no official comment on the scanning of live models at scientific meetings. Live scanning is commonplace in exhibit areas during meetings of the WFUMB World Congress.

In the absence of published policy, convenors of medical imaging conferences may (and probably do) assume there is no risk from unrestricted use of ultrasound on live models. It is not clear what the legal implications are for the absence of defined published policy by professional ultrasound organisations. This issue may deserve increased attention and advice of legal specialists, particularly in the present era of continually increasing demands of public liability matters. Presumably any ultrasound organization that allows and endorses the widespread use of live scanning at exhibitions without any guidelines or constraints assumes some responsibility and liability. The risk might include potential harm from unnecessary exposure or the risk of misdiagnosis or public display of unexpected pathology. Whilst pre-scanning can reduce the risk of finding unexpected pathology during an exhibition, it is unlikely to absolutely eliminate such risk. If that were true, misdiagnosis would never exist in clinical practice.

It is also sometimes proposed that demonstrations by trade-sponsored experts scanning live models (in a booth on the exhibition floor) provide "educational benefit". It is unlikely that this argument would be sustained in any robust and objective test of increased skill level achieved by an audience following such a demonstration on the exhibition floor. The audience is simply shown the diagnostic capabilities of the equipment and the technical ability of the expert giving the demonstration; essentially a marketing exercise. However, there are clear benefits in one-on-one teaching situations and it is feasible that live scanning sessions could be restructured to properly exploit such an option.

It is quite reasonable that potential purchasers of equipment will want to "test-drive" before committing to purchase any particular machine. A question remains: Is this an appropriate function for a scientific/medical congress whose purpose is the dissemination of new information to improve education and achieve best standards of practice of

ultrasound in medicine? If the answer is "Yes", then the process must be correctly managed to ensure benefits to all parties and reduction of risk to the live model. There is a range of issues including safety, ethics and medico-legal implications that require careful consideration. Whilst it is not helpful to be unnecessarily restrictive, there is a clear obligation to take a conservative approach and ensure protection of the patient against risk of potential harm. It is also important to protect professional ultrasound societies against possible risk of litigation in the event of any adverse outcome, whether due to misdiagnosis or the effects of ultrasound or the scanning procedure. The essential elements are clear unambiguous guidelines and proper declaration of purpose and risk to ensure informed consent by the live model.

THE SAFETY DEBATE

There is a clear correlation between the type of examination and potential risk. For example it is difficult to envisage a serious risk resulting from peripheral vascular imaging using normal examination procedures, in the absence of invasive endoluminal techniques or echo-contrast agents. Similarly, the risk of adverse health effects from ultrasonic imaging of musculo-skeletal problems is almost irrelevant compared with the bioeffects that might result from subsequent treatment by ultrasonic physiotherapy. However, the important issue in the debate about live scanning of models is that of unnecessary use of ultrasound on normal subjects.

The key elements in the assessment of safety of diagnostic ultrasound are described in the accompanying paper in this issue¹. With regard to evaluating the safety debate; while there are some areas where a reliable database allows strong consensus, such as on thermal effects in pregnancy, there are also areas of uncertainty and some speculation. This is particularly so for the status of research on 1st trimester effects on embryonic development. There is evidence that acoustic streaming occurs in liquid-filled body cavities during exposure to diagnostic ultrasound. In the absence of experimental evidence it is assumed that the modest streaming velocities involved may not affect embryonic integrity. However, the potential adverse effect of combined acoustic streaming and mildly elevated embryonic temperature during pulsed Doppler exposure in 1st trimester pregnancy is yet to be determined.

Human studies have occasionally reported changes in birth weight and right-handedness following intra-uterine exposure to diagnostic ultrasound, however the clinical significance of these reports is uncertain. The effects, in themselves, may not be hazardous but the existence of these findings adds an interesting scientific challenge to the safety debate.

It may be argued that there should be no concern over safety issues when using ultrasound equipment that complies with requirements of the Food and Drug Administration Centre for Devices and Radiological Health². However, it should be noted that the basis of approved prudent use is that ultrasound-aided diagnosis is carried out when medically indicated. It is generally accepted that there is no strong evidence of adverse human health effects of diagnostic

ultrasound and its use is not contra-indicated for medical purposes when a benefit from additional diagnostic information is expected. When a subject is repeatedly scanned for purposes other than achieving medical benefit, then it may be justifiable to impose greater margins of safety, particularly for obstetrics examinations. There are also ethical considerations that impact on standards of practice and policy guidelines. When non-medical applications are involved it may be most appropriate to adopt the simple approach of preventing live scanning of either 1st trimester, or of pregnant models in general.

NON-MEDICAL APPLICATIONS

The prudent use of medical ultrasound as advocated by ASUM and other ultrasound societies usually refers to "medically indicated" procedures, ie, those where an improved diagnostic outcome is expected from the procedure. The use of diagnostic imaging simply to view the fetus for demonstration purposes or to obtain a personal photograph or video does not constitute a medical use, in its strictest sense. In response to increasing commercial interest in marketing non-diagnostic "keepsake" videos and photos, the American Institute of Ultrasound in Medicine (AIUM) issued cautionary statements against what it describes as the *non-medical* use of diagnostic ultrasound³.

The FDA Centre for Devices and Radiological Health has also been quite outspoken, threatening regulatory action against the practice of commercial imaging of fetuses for "keepsake" videos². The FDA notified the medical community in the USA in 1994 regarding its concerns about the misuse of diagnostic ultrasound equipment and sought to discourage their patients from having sonograms for so-called "non-medical" reasons. The published FDA rationale states,

*"Although there is no evidence that these physical effects can harm the fetus, public health experts, clinicians and industry agree that casual exposure to ultrasound, especially during pregnancy, should be avoided. Viewed in this light, exposing the fetus to ultrasound with no anticipation of medical benefit is not justified."*²

The British Medical Ultrasound Society has published guidelines that permit the use of non-medical ultrasound, but only under conditions that significantly limit the ultrasound output⁴ and, hence reduce the risk to the patient in the absence of known benefit. The BMUS defines non-diagnostic use of ultrasound equipment as that including repeated scans for operator training, equipment demonstration using normal subjects, and the production of souvenir pictures or videos of a fetus. The BMUS guidelines for non-diagnostic uses of diagnostic ultrasound provide upper limits to the thermal index (TI<0.5) and mechanical index (MI<0.3). These are somewhat restrictive but were chosen to provide a lower degree of risk for procedures where there is no obvious clinical benefit. Note that the FDA limits output on equipment (for use in the USA) with an output display to MI<1.9 for all examinations except ophthalmic where MI<0.23 applies. There is no limit on TI, but intensity (spatial peak temporal average) is limited to a maximum of 720 mW/cm².

It is a matter of debate whether, or not, live scanning may be construed simply as an exercise in marketing the diagnostic ability of a particular piece of ultrasound equipment.

EFSUMB POLICY ON LIVE SCANNING

The EFSUMB has published policy⁵ which allows the scanning of live models on stands in the commercial exhibitions of EFSUMB Congresses, subject to a set of strict conditions as stated:

"EFSUMB finds no objection to the scanning of live models for the following purposes, subject to the conditions set out below:

On stands in the commercial exhibitions of EFSUMB Congresses.

In presentations by manufacturers which are ancillary to the Congress.

During scientific and tutorial sessions which form part of the Congress Scientific Programme.

Conditions for the use of live models:

The function of a live model must not be as an advertising/marketing attraction.

Pregnant women must not be used as live models.

Children under the age of 16 years must not be used as live models.

Contrast agents must not be administered.

Endoscopic, intracavitary and intravascular scanning is not permitted.

All live models must have given their full informed consent.

Models should not be used for consecutive periods of more than one hour.

All those who carry out live scanning must be able to confirm knowledge of ultrasound bioeffects and safety, and the significance of the on-screen display of thermal index and mechanical index.

The following upper limits for output should be adhered to: MI<1.0 and TI<1.0.

Equipment should be used in such a way as to minimise both TI and MI."

The conditions of use seem to be a reasonable attempt to minimise risk and potential ethical, moral and legal issues. Based on scientific knowledge that the developing fetus is sensitive to physical insult and that the introduction of contrast agents into the sound field increase the likelihood of cavitation events, application of a prudent avoidance model supports the prevention of fetal exposure or use of contrast agents. Similarly, intracavitary and endoscopic procedures carry a higher risk, associated with the procedure rather than ultrasound, and should not be applied outside a professional clinic. The EFSUMB policy conditions of use also state that *"all those who carry out live scanning must be able to confirm knowledge of ultrasound bioeffects and safety, and the significance of the on-screen display of TI and MI"*. There may be a reasonable argument that in the absence of higher risk (scanning pregnant women, use of contrast agents or intravascular, endoscopic applications) aspects of live scanning there is no need to limit other applications to levels below those permitted by the FDA. As a counter to this

Live scanning at Annual Scientific Conferences: a new look at ASUM policy

argument it should be accepted that by the imposition of upper limits of TI and MI for use at scientific congresses there is an opportunity to raise awareness of the purpose of these output displays. This is an important consideration, given the general low level of understanding of the AIUM/NEMA Output Display Standard since its introduction more than a decade ago.

CONCLUSION

The potential risk, no matter how small, should always be weighted heavily against benefit when there is little or no medical benefit to the scanned subject. The distinction between marketing, education, and medical benefit can be blurred, nevertheless it is in the best interests of professional ultrasound societies to exercise care to ensure a proper balance to minimise risk and to maintain high professional standards. As ASUM develops its initiatives of promoting co-operation and enhanced standards of practice in the Asia-Pacific region through implementation of the ASUM Asia-Linkage Program, it is timely to review ASUM policy on the use of models for live scanning at annual scientific conferences. This paper is presented to advise members that the Safety Committee is currently drafting a revised policy

document for live scanning at exhibitions, to be submitted for consideration by ASUM Council.

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Andrew Heggie on 02 9817 0955 info@originindustries.com

The advertisement features a dark background with two pieces of medical imaging equipment. On the left is a large, white, circular CT scanner. On the right is a smaller, white, mobile ultrasound machine with a monitor and keyboard. The text is in white and light gray, with the company name in a large, bold, sans-serif font.

DRAFT THYROID WORKSHEET

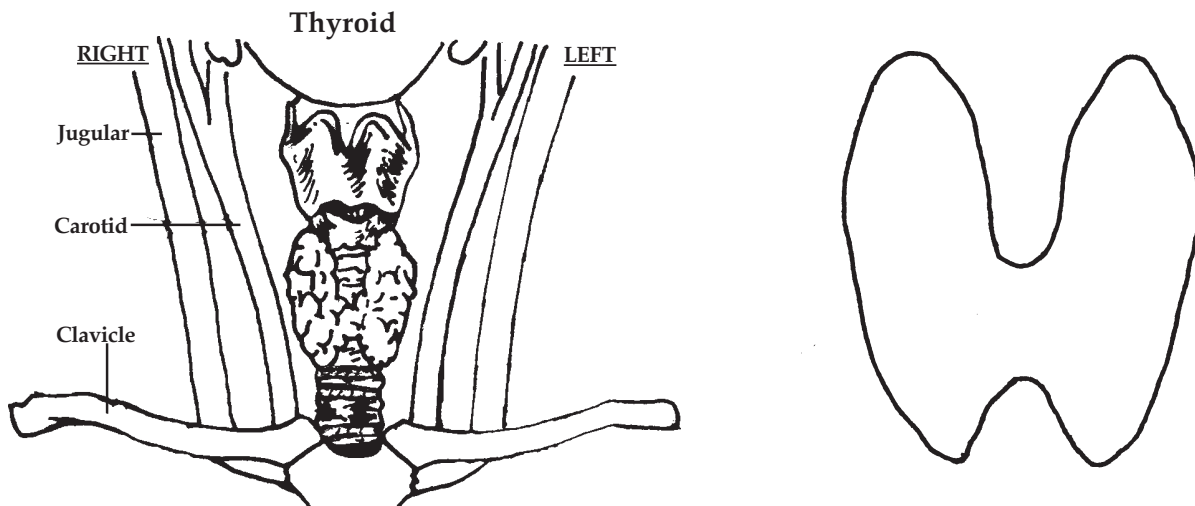
SONOGRAPHER PATIENT NAME

SONOLOGIST EPISODE/Accession No

Date ... / ... /200... DOB ... / ... / ... MRN/URN

Indications for study

Mark and number nodules, lymph nodes and other findings on diagrams



Focal Thyroid Nodules - indicate location by number on diagram

THYROID	Maximum Diameter (mm)	Other Diameters (mm)	Margins (Poor, well circumscribed)	Echogenicity	Echocharacteristics (Homogeneous, heterogenous, calcifications)
Nodule 1					
Nodule 2					
Nodule 3					
Nodule 4					
Nodule 5					
Nodule 6					
Nodule 7					
Nodule 8					

Focal Parathyroid Nodules - indicate location by number on diagram

PARATHYROID	Location	Maximum Diameter (mm)	Other Diameters (mm)	Echogenicity	Characteristics
Nodule 1					
Nodule 2					
Nodule 3					
Nodule 4					

Other comments

This worksheet represents the consensus of a small group of practitioners. It has been published to stimulate discussion towards the establishment of a library of worksheets. It does not represent any official policy or statement of ASUM.

DRAFT TRANSPLANT RENAL WORKSHEET

SONOGRAPHER

PATIENT NAME

SONOLOGIST

EPISODE/Accession No

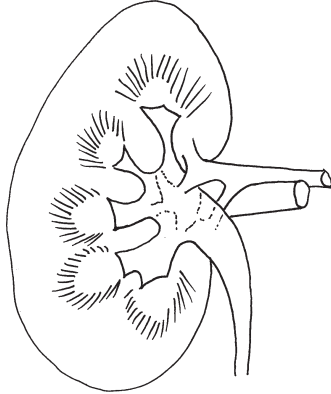
Date . . . / . . . /200

DOB . . . / . . . /

MRN/URN

Indications for study

Mark cortical thinning, echotexture changes, focal changes and other findings on diagram



FINDINGS	Transplant KIDNEY		
Longitudinal (mm)			
Mid pole transverse/coronal (mm)			
Mid Pole AP/axial (mm)			
Volume Estimate (cc)			
Cortical echotexture			
low/normal/high			
Pyramid echotexture low/normal			
Comments (focal hypoechogenicity = oedema or necrosis)			
	Main RENAL Artery		Iliac (native) artery
Peak systolic velocity (cm/s)			
Pulsatility Index (N<1.8)			
Resistive Index (N<0.7)			
Waveform/Ratios/Diastolic reversal			
Arcuate Arteries	Upper	Mid	Lower
Pulsatility Index (N<1.8)			
Resistive Index (N<0.7)			
Waveform/flow reversal			
Interlobar Arteries			
Pulsatility Index (N<1.8)			
Resistive Index (N<0.7)			
Waveform/flow reversal			
BLADDER	Pre-micturition		Post-micturition
Wall thickness			
Volume			
Other			
Hydronephrosis			
Hydroureter			
Perinephric collection			

This worksheet represents the consensus of a small group of practitioners. It has been published to stimulate discussion towards the establishment of a library of worksheets. It does not represent any official policy or statement of ASUM.

DRAFT UPPER LIMB VENOUS WORKSHEET

SONOGRAPHER PATIENT NAME

SONOLOGIST EPISODE/Accession No

Date ... / ... /200... DOB ... / ... / ... MRN/URN

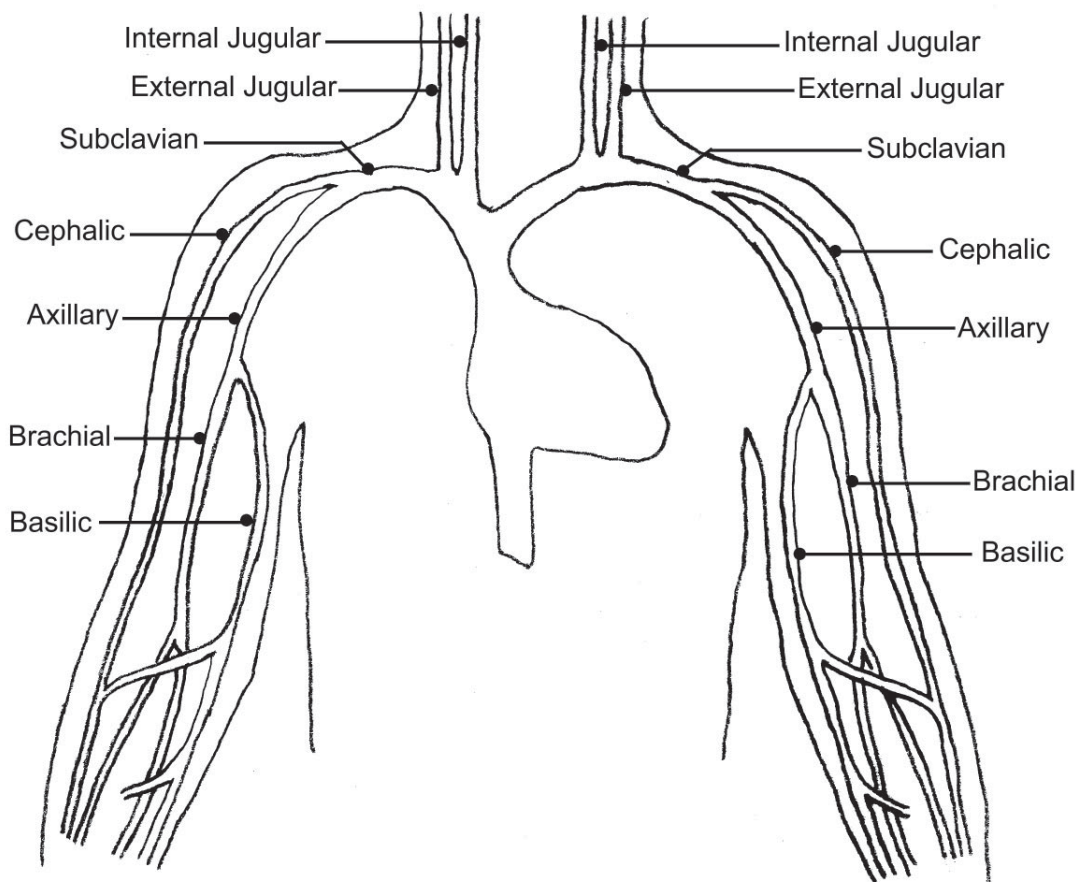
Indications for study

Findings and Comments

Upper Limb Duplex

RIGHT

LEFT



This worksheet represents the consensus of a small group of practitioners. It has been published to stimulate discussion towards the establishment of a library of worksheets. It does not represent any official policy or statement of ASUM.

Book reviews

Title: Techniques in Noninvasive Vascular Diagnosis. An Encyclopedia of Vascular testing.
Author: Robert J. Daigle BA, RVT
Publisher: Summer Publishing, Littleton, Colorado
Email: Summerpublishing@aol.com
Approximate Price: \$140 which includes shipping and handling. Order by contacting www.summerpublishing.com

As the title suggests, this is a very practical publication on how to perform vascular ultrasound scanning and functional non-invasive vascular tests. It is concise and the majority of it is in point form. It does not cover in depth, the anatomy and physiology/pathophysiology of arterial and venous systems but does cover the basic anatomy of each region and some physiology/ haemodynamics.

It covers the majority of applications of vascular ultrasound. There are chapters covering:

Principles of Doppler ultrasound, carotid duplex scanning and interpretation (includes measurement of stenosis by angiography and duplex), vertebral and subclavian imaging, venous anatomy and haemodynamics, venous imaging and photoplethysmography, vein mapping prep, and upper arm venous imaging.

Arterial chapters cover relevant basic anatomy, physiology and haemodynamics, leg artery duplex imaging, physiologic testing which includes ankle/brachial index, pulse volume recording, Doppler waveform analysis and exercise testing. Arterial bypass grafts/stents are covered as well as upper arm arterial duplex and non imaging methods.

Other areas covered are vasculogenic impotence, transcranial Doppler, abdominal scanning fundamentals and haemodialysis access fistulas and grafts.

The diagrams in the text are clear and well labeled. Ultrasound images in the text are also clear, easy on the eye and relevant to the text. Unfortunately all images are black and white. Colour images of colour Doppler signals could have given more information and been more educational.

Scattered throughout each chapter are relevant tips, suggestions and pitfalls to look out for which are based on the authors extensive experience in vascular ultrasound.

The publication is ringbound which on the positive side has kept the price low, however, if used extensively, the pages may tear and fall out.

The chapter on abdominal vascular imaging is quite basic with limited and dated information on abdominal aortic endoluminal grafts.

Importantly, to assist the reader, there are references at the end of every chapter and suggested additional reading. There are also 30 MCQ review questions and answers at its conclusion.

As mentioned previously, this is a very practical, "how to do it" type of publication which would be very beneficial to sonographers working in isolation or in remote areas where supervision or peer support is minimal. Its coverage of topics such as anatomy, physiology, pathophysiology and haemodynamics is quite basic, so it would not be adequate to satisfy the DMU vascular syllabus. It would be a useful adjunct to have in practices that are educating sonographers in vascular ultrasound as it gives an accurate "step by step" approach to vascular scanning. This publication would be of benefit not only to the trainee but the trainer as well.

**Warren Lewis DMU (Vascular)
 CardioVascular Centre, Newcastle, Australia**

Title: Differential diagnosis in obstetric and gynecologic ultrasound
Authors: RAL Bisset, AN Khan, and NB Thomas
Publishers: Saunders (Elsevier Science Inc)
Year: 2002
Approximate Price: \$A123 (including GST)

Differential Diagnosis in Obstetrics and Gynecologic Ultrasound is a terrific book and one that is going to stay close by my side during day-to-day clinical work. The 2002 publication is the second edition of the text, the first edition having been published in 1996. The authors are radiologists from Manchester, UK.

The book is a soft-covered book of some 430 pages. Its purpose is to provide a compact handbook that provides a lot of diagnostic information in a concise, list style format. Lists of possible diagnoses are combined, where applicable, with more detailed explanatory paragraphs. The very detailed Contents list and Index make it easy to find topics of interest, an important feature of a book designed to provide readily accessible information in the clinical setting.

My initial reaction on opening the book was negative, as it has no images or diagrams. However, as the authors point out this allows the production of a small, compact handbook providing a great deal of diagnostic information, and this it certainly does. After reading the contents of the text, the lack of images and diagrams seems far less important. The information is well sourced and good reference lists are provided at the end of each section (often a single page). I found this a very useful feature as it would allow easy follow-up of areas of particular interest and allows the reader to see the quality of the source material very quickly and easily.

The majority of the text is devoted to obstetrics, approximately 360 pages in total, with good coverage of all areas including early pregnancy, fetal anomalies and growth and well-being. I found the section on the fetal musculoskeletal system particularly well done as this is an area where there is often so much information in

Book reviews

comprehensive texts it is hard to approach differential diagnoses in a logical, systematic way.

A small section at the end of the book is devoted to obstetric and gynecologic emergencies and non-obstetric emergencies peculiar to pregnancy. This also appealed to me as a very logical presentation of possible problems in the emergency setting.

My only real criticism of the book is that there appears to be a mistake in the description of diagnosing zygoty in twin pregnancies. It is essentially corrected on the next page where the chorionicity and amnionity are discussed, however for people who find the correct classification of twinning difficult already (and in my experience this applies to many) this would only serve to confuse.

Apart from the minor criticism above, I found this a very easy to read, appealing book. It is the sort of book you could pick up in the odd spare minute and no doubt learn something useful. I would highly recommend this to any department where obstetric and gynaecologic ultrasound is performed. I also think it would be very useful to anyone studying for exams in ultrasound, eg student sonographers, radiology registrars and obstetric sonologists, and all those involved in teaching in obstetric and gynecologic ultrasound.

Margo Gill
Sydney Ultrasound for Women

Title: Case Review: General and Vascular Ultrasound. Case review Series
Author: William D Middleton
Publisher: Mosby
Published: 2002 ISBN 0-323-00736-8

This book contains clinical ultrasound case studies covering the areas of vascular and general sonography. There are three sections within the book and as their names suggest "opening round", "fair game" and "challenge" the cases get progressively more difficult. This 242-page book contains good quality duplex images, with appropriate colour plates and spectral Doppler information to support the black and white images. Usually 4 questions are posed for each set of images with the answers to the questions over the page. This format makes it easy to test your knowledge and obtain quick feedback. There are 211 different case studies to access your knowledge; at least 57 of these are specifically vascular cases.

This book is an excellent resource for the student sonographer as well as the tutor sonographer. It would be a valuable asset in the bookcase of any sonographer.

Lucia Pemble PhD DMU (Vascular)
Lecturer in Medical Ultrasound
Queensland University of Technology

Title: An Atlas of Small Parts and Musculoskeletal Ultrasound with Color Flow Imaging, 2nd Edition
Author: PK Srivastava
Publisher: Jaybee Brothers, Medical Publishers (P) LTD, New Delhi Distributed outside of South Asia by Lippincott Williams & Wilkins.
Approximate Price: \$A218.00

The practice of ultrasound varies considerably from country to country. The primary author of this text practices in Lucknow, India and his case material indicates considerable expertise in ultrasound particularly of body parts radiologists rarely examine in Australia and New Zealand such as the eye and the neck. Many cases of tuberculosis, cysticercosis and hydatids are presented, for example hydatids of the breast, cysticercosis of the eye and testicular tuberculosis.

As indicated in the title, the book is an atlas, containing over 2000 illustrations. Most are ultrasound images complemented by some clinical photographs and the occasional image from a CT or a diagram. Unfortunately the image reproduction is not as good as has been achieved in other texts. Many of the images are taken from equipment that is a number of years old, which can be distracting but does not need to detract from their usefulness as teaching examples. Text is brief but to the point.

The book is divided into 12 chapters on the eye, thyroid, neck, neonatal brain, chest, breast, gastrointestinal system, prostate, scrotum, penis, anterior abdominal wall and the musculoskeletal system. I found the chapters on the eye and neck most interesting since these are regions we scan infrequently in our practice. The range of examples of pathology in the orbit is broad, including numerous congenital abnormalities, tumours, periorbital masses, trauma and infection.

The chapter on musculoskeletal imaging is disappointing but this is partly because musculoskeletal ultrasound practice is different in Australia, where accurate diagnosis of many types and grades of sports injury using ultrasound has become common practice and is highly developed.

The index is sparse and it might have been helpful to have topic headings at the beginning of each chapter to find specific cases more easily. For example cysticercosis does not come under 'c' in the index but as a subheading under 'parasites'.

Overall I found this a fascinating book to read. Although not practically useful for most ultrasound sites in Australia or New Zealand, it would be a great asset to a library, first as a resource for examples of conditions rarely seen in those countries and second to highlight how practice can vary depending on the clinical context and availability of other modalities. It would also be a useful text for anyone planning to work in Asia or in a similar clinical context.

Patsy Robertson FRANZCR
Royal Melbourne Hospital

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Register Early to avoid disappointment

Obstetrics and Gynaecology Symposium

Conrad Jupiters, Gold Coast Australia

Scientific Convenor

Dr Stephen Sinnott

International Keynote Speaker

Professor Lilith Valentin

5-6 March 2004

**Promoting Excellence in Ultrasound**
Australasian Society for Ultrasound in Medicine

ASUM wins WFUMB 2009 at the AIUM/ WFUMB Congress in Montreal!

It was a day to remember in the history of ASUM. On Saturday 31 May 2003, after 2 years of a complex and challenging bidding process, ASUM finally won its bid to host the World Congress of WFUMB in year 2009 in Sydney.

ASUM's bidding team was Dr Glenn McNally, ASUM President, Dr Stan Barnett, ASUM Immediate Past President and Dr Caroline Hong, ASUM CEO; supported by Jon Hutchison, Managing Director of the Sydney Convention and Visitors Bureau and Barrie Markey, Managing Director of ICMS Pty Ltd. Much effort has gone into the bidding process spanning over 2 years, demonstrating all aspects of ASUM's capabilities and Sydney's attractions to host a world congress in September 2009.

ASUM prides itself as a rapidly growing professional multidisciplinary society in "PROMOTING EXCELLENCE IN ULTRASOUND". ASUM now has more than 2500 members from Australia, New Zealand and overseas. Membership is growing and there is increasing interest in the ASUM. The WFUMB 2009 World Congress will provide opportunities for delegates from all over the world to visit Australia with their families to experience a world class educational, scientific and social program, covering all aspects of the latest advances in knowledge and technology in medical ultrasound.

"Winning this bid to host a world medical ultrasound congress is a major achievement for ASUM. ASUM will continue to play a pivotal role in contributing to advances in promoting excellence in medical ultrasound around the world."

Dr Glenn McNally, President of ASUM

ASUM is one of the six federations/societies affiliated to WFUMB. This world class congress will attract between 3000 to 5000 delegates and their families from around the world to Sydney. The last time a world congress in ultrasound was held in Australia was in 1985. ASUM will hold an Asian-Pacific Ultrasound Congress in conjunction with the WFUMB 2009 Congress in Sydney. The World Federation of Sonographers Congress will also be held during the week of the WFUMB 2009 Congress.

Dr Stan Barnett has been appointed the Convenor for WFUMB 2009 Congress, with Dr Glenn McNally as the Treasurer. ASUM wishes to thank all the supporters and friends of ASUM who supported and encouraged the bidding team throughout the whole process.

REPORT ON THE 10TH WFUMB WORLD CONGRESS

The WFUMB 2003 World Congress was held at the colourful Palais des congrès de Montreal Convention Centre. It was hosted by AIUM, the American Institute of Ultrasound in Medicine and was preceded by the 7th World Federation of Sonographers (WFS) Congress which was held over 2 days

from 31 May to 1 June 2003. The WFUMB 2003 Congress which opened on 1 June with a welcome address by the WFUMB President, Dr Hiroki Watanabe and the AIUM President, Dr Alfred Kurtz, a keynote address by Timothy Johnson on "Medicine and the Media" and musical entertainment by a group of four women who sing music from every corner of the melodic spectrum.

The next 3 days of the Congress included 18 different ultrasound related areas of interest with plenary sessions, scientific sessions, meet the professor round table sessions, symposiums and debates. The posters and case studies sessions also attracted a lot of interest. The Congress was supported by more than a hundred exhibitors and attended by about 2000 people.

ASUM exhibited an education booth during the Congress, promoting ASUM meetings and educational resources. As the Exhibition was opened after the announcement of ASUM's win to host the WFUMB 2009 World Congress, the ASUM booth naturally attracted a lot of publicity and excitement.

Dr Stan Barnett presented 2 lectures: the ASUM Asia Link Program (replacing Dr Andrew Ngu who unfortunately could not travel to this meeting) and Ultrasound Induced Temperature Rise in the Fetal Brain.

At the WFUMB General Assembly, which was held on 4 June 2003, Dr Hiroki Watanabe handed over the Presidency to Dr Marvin Ziskin who will serve for a period of 3 years until 2006. Dr Giovanni Cerri was elected as

the President-Elect and will be the President from 2006 to 2009, and hence will also be the Congress President for WFUMB 2009 in Sydney.

ASUM now has two representatives on the Council of the World Federation. Dr Stan Barnett was elected as Secretary of the WFUMB Council. Dr Glenn McNally was nominated by ASUM and elected as WFUMB Councillor at the General Assembly held in Montreal. Dr George Kossoff was also awarded Life Membership at this meeting.

There were more than 30 Australians seen at the Congress and many expatriot Australians also paid a visit to the ASUM exhibition booth to say a friendly hello to the ASUM team. Dr Dave Carpenter and Janine Horton, both ASUM Councillors, were of great assistance in attending to the booth during the busy exhibition periods.

In summary, it was a successful trip to Montreal and ASUM's team, who went with a mission to win the bid, came home safely with good news for all. Now the hard work begins and there is plenty to do to ensure a great and successful world congress in 2009 in Sydney. Congratulations to the ASUM and there is every reason to rejoice.

Dr Caroline Hong
Chief Executive Officer



From left to right: Mr Barrie Markey, Dr Glenn McNally, Dr Caroline Hong, Dr Stan Barnett, Mr Jon Hutchison



"Friends of ASUM" Reception



Prof Hiroke Watanabe handed over the Presidency of WFUMB to Dr Marvin Ziskin



ASUM CEO Dr Caroline Hong with John Buhler of GE Medical Systems



Back: Stan Barnett, Marvin Ziskin, Attir Freimanes, Richard Meyer, Hiroki Watanabe, JJ Critennan; Front: Peter Wells, Barry Goldberg, Jack Reid, Thommy Thompson, George Kossoff



President of WFUMB Prof Hiroki Watanabe visited ASUM Booth



Dr Dave Carpenter, Dr Caroline Hong and Janine Horton



Dr Glenn McNally, ASUM President in Montreal



Dr Giovanni Cerri, Mrs G Cerri, Mrs S Barnett, Dr Stan Barnett and Dr Leandro Fernandex



WFUMB 2006 Booth



WFUMB Councillors



Marvin Ziskin addressed at the City Hall



ASUM and WFUMB Councillors

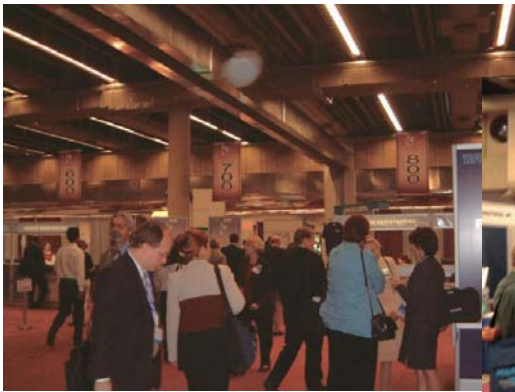


ASUM and AIUM CEOs



AIUM Booth

Reports



← Exhibition Hall



← Toshiba Booth



↑ Internet Cafe



↑ HistoScanning Booth



← Philips Medical System Booth



↑ A case study



↑ History Booth



← Case Studies Exhibition



↑ GE Medical System Booth

New members – July 2003

Full Members

Raouf Farag	NSW
Simon Hobbs	SA
Guanghong Huang	NSW
David Rosengren	QLD
Minh Hung Tran	VIC
Nigel Clark	QLD
Jason Fong	VIC
Longina Lipianin	VIC
Ingrid Peters	VIC
Terry Taylor	WA
Jennifer Weeks	NZ

Gail Doyle	VIC
Rachael Dunnicliff	VIC
Kate Easton	NZ
Rochelle Fletcher	NZ
Carolyn Fredericks	WA
Susan Hamilton	NZ
Christopher Hunter	VIC
Maria Jackett	NZ
Lisa Jesson	NZ
Sharon Kay	NSW
Emma Larkin	VIC
Madeline Lee	NSW
Michael Lewis	VIC
Geradine Louis	NSW
Scott Manning	QLD
Sarah Moyle	SA
Shareni Moodley	NZ
Carrie Morgan	QLD
Anthony Morris	NSW
Lan Nguyen	NSW

Justin O'Leary	NSW
Yana Parsi	NSW
Michael Rock	WA
Rebecca Rutherford	NZ
Fiona Scoffell	SA
Selcuk Semirli	VIC
Kym Smith	QLD
Rebecca Thomas	SA
Simon Undrill	VIC
Robyn Walker	NSW
Amanda Walsh	SA
Rohan Wilson	VIC
Melanie Yeates	NZ
Steven Zakic	VIC

Associate Members

Deirdre Anderson	NZ
Mayasa Athmani	VIC
Julie Bradbury	NSW
Nathan Collins	NSW
Suzanne Davy-Snow	NZ
Hilma Dillon	QLD

Scott Manning	QLD
Sarah Moyle	SA
Shareni Moodley	NZ
Carrie Morgan	QLD
Anthony Morris	NSW
Lan Nguyen	NSW

Trainee Member

Dominica Zentner	VIC
------------------	-----

Associate Correspondence Member

Elaine Kilby	CANADA
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DDU examination results

The following were successful in the examinations held in May - June 2003

Part I

Natalia Andreianova	NZ
Renuka Bhat	NZ
Julian Castro	VIC
Julie Ching	VIC
Jason Chuen	VIC
Kim Connelly	VIC
Thomas Daly	NSW
Stephen Dunjey	WA
Marilyn Fooks	VIC
Pallav Garg	VIC
Adrian Goudie	UK
Paul Gould	VIC
Andrew Haig	WA
Bao Huy Ho	NSW

Lisa Hui	NSW
Sonya Jessup	VIC
Clement Loy	NSW
Michael Mulmann	VIC
Nimalan Nadarajah	VIC
Bernard Han Kim Ng	ACT
Quyen Huu Nguyen	NSW
Kara Okesene-Gafa	NZ
Aravind Ravi Kumar	NSW
James Rippey	WA
Sally Rodrigues	SA
Marcin Roman	NSW
Patsy Siok Hwa Soon	NSW
Jillian Spilsbury	NSW
Rohit Tamhane	ACT

Anthony White	VIC
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Part II

Lucy Bowyer	NSW
Helen Clarke	WA
Ley-Ping Eu	VIC
Deepak Haikerwal	VIC
Mark Krawczynszyn	VIC
Nagush Saunlo Naik Gaunekar	SA
Justin Nasser	VIC
Fatima Patel	QLD
Jeremy Pereira	VIC
Sofie Piessens	VIC
Edwin Tam	NSW
Rodney Teperman	VIC

IMPORTANT NOTICE for All DMU Candidates

Due to the Australasian Sonographer Accreditation Registry (ASAR) requirement for all trainee sonographers to annually renew their Student Status Category, the closing date for DMU Examination Applications for 2004 is now 31 January. All DMU candidates presently preparing for their DMU examinations are reminded that the ASAR requires annual registration of your Student Status. For candidates sitting examinations in 2004, Student Status is granted along with their examination application.

2004 DMU Student Status Closing Date	31 Jan 2004
2004 DMU Part I & II Examination Closing Date	31 Jan 2004

DMU 2003 Examination Dates

Closing date for Application for an Exemption	Fri 21 Mar 2003
Closing date for Part I and Part II Application	Wed 30 Apr 2003
Part I and Part II Written Examination	Sat 19 Jul 2003
Part II Practical Examination	Sept & Oct 2003
OSCE Examination:	
Perth	Mon 8 Sept 2003
Sydney	Sat 20 Sept 2003
Auckland	Sat 27 Sept 2003
Brisbane	Sat 4 Oct 2003
Melbourne	Sat 4 Oct 2003
Part I Statement of Attainment	mailed out in November 2003.
Part II results	mailed out in November 2003.

Joint Meeting of ASUM (NZ Branch) and RANZCR (NZ Branch), 25 – 27 July 2003



Chris Kohlenberg Teaching Fellowship 2003

The two Chris Kohlenberg Teaching Fellows for 2003 are Mrs Jenifer Kidd and Dr Matthew Andrews. Matthew will be conducting meetings in Queensland. Jeni will be conducting meetings in South Australia, details of these meetings follow.

Tuesday 30 September 2003
Mt Gambia

Thursday 2 October 2003
Whyalla

Saturday 4 October 2003
Adelaide half day meeting 9 am – 1 pm

The Chris Kohlenberg Teaching Fellowships are sponsored by GE Medical.



GE Medical Systems
Ultrasound

Professor Lilith Valentin

Guest Speaker at the 9th ASUM O&G Symposium

Gold Coast 5-6 March 2004

Professor Valentin graduated from the University of Lund, Sweden, in 1974, became an authorized physician in 1975 and a specialist in obstetrics and gynecology in 1980. Since 1992 she has been a consultant in obstetrics and gynecology, and since 2002 has been professor in obstetrics and gynecology, Malmö University Hospital, Lund University. Her main research interest is in gynecological and obstetric ultrasound, particularly gynecological Doppler ultrasound.

The 9th ASUM O&G Symposium is being held in conjunction with the ASUM Multidisciplinary Workshop.

Sonographer Wanted

General ultrasound, musculoskeletal and some Doppler. Excellent conditions, part time available, full time locum wanted for September.

Sydney Radiology, Cremorne. Contact: Christine Chamberlain Tel: (02) 8969 8400 or Fax: (02) 8969 8499.



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- *US 57-13 130 gram tube, 10 per box

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CD-ROM

Atlas of Vascular Ultrasound Yisha Tong MB BS MD

A complimentary CD-Rom is enclosed with this copy of the ASUM Bulletin

This CD-ROM covers practical considerations of vascular ultrasound, cerebral arteries, peripheral arteries and grafts, peripheral veins, and abdominal and pelvic vessels and grafts. The CD-ROM provides a wide range of vascular ultrasound images and explanatory notes including practical tips and diagnostic criteria. All images and topics are easily navigated through contents, index and key word hyperlinks. The CD-ROM can be used as a reference resource for clinicians and students.

This CD-ROM is issued to ASUM members as a complimentary member benefit. Our distribution license does not authorize us to sell copies. Currently it is not available for purchase. To run this program you need a computer with Microsoft Windows 95 or above and Arial, Arial Narrow, Flexure and Time New Roman Fonts installed.

The production of the CD-ROM has been sponsored by Philips Medical Systems.

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Queensland: Private practice in beautiful coastal location requires locum Sonographer from August 2003. Experience in all areas of diagnostic ultrasound will be highly valued and rewarded with excellent remuneration.

Western Australia: Want a career move that blends with a relaxing lifestyle? With the best climate of any State capital, Perth has it all. Our client, a leading private practice, requires Sonographers on a locum or perm basis. Excellent long-term career opportunities available.

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- **Ultrasound Techniques in O&G**
 - **3 day program covering**
 - gynaecological scanning – Friday 17th October
 - obstetrics theory & practical – Saturday 18th & Sunday 19th October
 - **5 day program 22nd – 26th October, covering**
 - Practical O&G scanning techniques using volunteer models
 - Small registration numbers – highly intensive practical tuition
- **Musculoskeletal Ultrasound Techniques**
 - **Weekend program – theory & practical 8th & 9th November**
 - **5 day intensive practical program – 20th-24th November**

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Contact Numbers

Phone: (07) 55266655 Fax: (07) 55266041 Email: sue@aiu.edu.au
 Program Information: Sue Davies Registration Information: Sally Ashwin

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St George's Healthcare NHS Trust is one of the largest healthcare providers in the United Kingdom with around 1170 beds and treating around 80,000 inpatient and day cases, and over 300,000 outpatients annually. The Trust employs over 4000 staff incorporating 575 Medical & Dental Staff.

The non-invasive diagnostic vascular service at St Georges Hospital is a recently established and expanding service. The service is based in the department of vascular surgery. The recently refurbished vascular laboratory is situated in the department of surgery close to the vascular surgical ward. The laboratory is spacious and air-conditioned and is equipped with an ATL 5000 colour duplex ultrasound machine. In addition to the laboratory, the service has a satellite room that operates in the radiology department. We work closely with the four consultant vascular surgeons and interventional radiology team. At present the service is provided by two experienced clinical vascular scientists and a recently appointed graduate trainee. We are now seeking an experienced scientist to complete the team and we are intending to purchase a second duplex scanner this year.

The service carries out investigations across the full range of vascular examinations including the upper/lower limb venous and arterial studies, carotid/vertebral artery, surveillance for vein grafts, transcranial Doppler, intraoperative exams and endovascular procedures. The department has a dynamic, friendly atmosphere and has recently appointed a new professor of vascular surgery. There will be opportunities to take part in ongoing research project and teaching/demonstrating.

We are looking for an experienced clinical vascular scientist to join our growing team. We would prefer applicants with Australian accreditation and a minimum of 2-3 years experience, but would consider applications from persons who can demonstrate satisfactory practical experience in vascular technology and holds a BSc or equivalent biological/physiological/physics qualification. If not yet, accredited additional training will be provided where required and candidates will be positively encouraged to study for the Society of Vascular Technology Accreditation (AVS). In addition to clinical duties the candidate would be expected to be involved in training of junior staff, departmental research projects and some administration duties. A full time administrator supports the service.

British passport or residency would be preferable but we would consider arranging work permits for applicants wishing to stay for 2 years. For informal enquiries please contact Elaine Young or Kate Sommerville on 0044 208 725 2151 or email katesommerville@aol.com, or mseyoung@aol.com.

Applications by CV and covering letter. Please email your applications to nadia.zerroud@stgeorges.nhs.uk alternatively you can post your applications to The Human Resources Department, Recruitment Services, 1st Floor, Grosvenor Wing, St George's Hospital, Blackshaw Road, London SW17 0QT.

For a job description write to the above address or Tel: 020 8725 3591 (24 hour answerphone) or email nadia.zerroud@stgeorges.nhs.uk for a electronic copy. Please quote the above reference number. Interviews will be conducted by telephone if required.

Closing date for completed application forms: 22nd August 2003

Calendar of ultrasound events

Thu 14 Aug 2003 Breast, sentinel node biopsy etc *Venue:* King Edward Memorial Hospital Lecture Theatre, Perth *Contact:* Kym Webb, Ph: 08 9340 2700; Email: kymweb@aol.com

Sun 31 Aug 2003 - 4 days 13th World Congress on Ultrasound in Obstetrics and Gynecology *Venue:* Paris, France *Contact:* Email: isuog@concorde-uk.com; Website: <http://www.isuog2003.com>

Thu 4 Sep 2003 - 4 days ASUM 2003. 33rd Annual Scientific Meeting of the Australasian Society for Ultrasound in Medicine *Venue:* Burswood International Resort, Perth, Western Australia *Contact:* ASUM, 2/181 High Street, Willoughby NSW 2068. Ph: 61 2 9958 7655; Fax: 61 2 9958 8002; Email: asum@asum.com.au

Thu 11 Sep 2003 - 3 days Echo Australia 2003 *Venue:* Sydney *Contact:* Lou Coster, Ph: 02 9846 4658; Email: lou.coster@australia.ge.med.com

Wed 1 Oct 2003 - 4 days 7th ISUM Pre-Congress Course/1st ASBD Teaching Course *Venue:* Menara Peninsula Hotel, Jakarta, Indonesia *Contact:* Ms Maria, Ph: 6221 723 2623; Fax: 6221 722 4375; Email: d_m@cbn.net.id

Tues 7 Oct 2003 - 5 days 13th Annual Conference on Musculoskeletal Ultrasound *Venue:* Omni Shoreham Hotel, Washington DC, USA *Contact:* Email: dipietro@umich.edu; Website: www.musoc.com (Organising agent: MultiTravel Connection, Ph: 1 800 238 7498 (in USA) or 1 407 679 8848; Email: multitravelusa@aol.com)

Fri 10 Oct 2003 - 6 days Australian and New Zealand Society of Vascular Surgery: Vascular 2003 *Venue:* Hotel Sofitel Melbourne *Contact:* Waldren Smith Management Conference Organisers, Ph: 03 9645 6311; Fax: 03 9645 6322; Email: info@wsm.com.au

Mon 13 Oct 2003 Thyroid, Barry Flynn *Venue:* JJH *Contact:* Ian Dalziel, Ph: 02 6201 6140; Email: Ian.dalziel@calvary-act.com.au

Thu 16 Oct 2003 - 4 days Society of Diagnostic Medical Sonography 20th Annual Conference *Venue:* Dallas, Texas *Contact:* Ph: 800 229 9506; Email: meetings@sdms.org

Thu 23 Oct 2003 Bowel maging *Venue:* King Edward Memorial Hospital Lecture Theatre, Perth *Contact:* Kym Webb, Ph: 08 9340 2700; Email: kymweb@aol.com

Thu 6 Nov 2003 - 2 days ASUM and the Medical Ultrasound Society of Thailand (MUST) Asia Link Ultrasound Meeting *Venue:* Bangkok, Thailand *Contact:* Dr Caroline Hong, ASUM CEO, Email: carolinehong@asum.com.au

Sat 8 Nov 2003 Fetal Cardiology Course. The Fetal Medicine Foundation *Venue:* London *Website:* www.fetalmedicine.com

Mon 17 Nov 2003 ASUM Christmas function *Venue:* Lamont's Function Centre, East Perth *Contact:* Dr Karen Margolius, Forensic Pathologist, Charles Gardener Pathology Centre, 9346 3333

Sat 22 Nov 2003 The 11-14 Week Scan. The Fetal Medicine Foundation *Venue:* London *Website:* www.fetalmedicine.com

Mon 8 Dec 2003 Fetal Echocardiography *Contact:* Ian Dalziel, Ph: 02 6201 6140; Email: Ian.dalziel@calvary-act.com.au

Wed 10 Dec 2003 - 3 days BMUS 35th Annual Scientific Meeting and Exhibition *Venue:* Harrogate International Centre, UK *Contact:* The British Medical Ultrasound Society,

Ph: 44 0 20 7636 3714; Email: bmus2003@bmus.org; Website: www.bmus.org

Fri 5 Mar 2004 - 2 days ASUM Multidisciplinary Workshop *Venue:* Conrad Jupiters, Gold Coast *Contact:* ASUM, 2/181 High Street, Willoughby NSW 2068. Ph: 61 2 9958 7655; Fax: 61 2 9958 8002; Email: asum@asum.com.au

May 2004 - 3 days Australian Sonographers Associations 11th Annual Conference *Venue:* Melbourne *Contact:* Elaine Trevaskis, Ph: 03 9585 2996

Fri 7 May 2004 - 4 days VIII World Congress of Echocardiography and Vascular Ultrasound *Venue:* Antalya, Turkey *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

Mon 17 May 2004 - 6 days 7th Congress of the Asian Federation of Societies for Ultrasound in Medicine and Biology (AFSUMB)/77th Meeting Japan Society of Ultrasonics in Medicine *Venue:* Utsunomyia-City, Tochiqi, Japan *Contact:* Prof K Itoh, Dept of Clinical Lab Medicine, Jichi Medical School, Minamikawachi, Tochiqi-ken 329 0498, Japan, Ph: 81 285 587 385; Fax: 81 285 448 249; Email: itokoiti.jichi.ac.jp

Wed 19 May 2004 - 4 days IXth International MASU Congress and International course *Venue:* Al Assad University Hospital, Damascus, Syria *Website:* <http://www.agonet.it/masu>

Sun 20 Jun 2004 - 2 days Advanced Course in Fetal Medicine *Venue:* Paphos, Cyprus *Contact:* www.fetalmedicine.com

Sun 20 Jun 2004 - 4 days 2004 AIUM Annual Convention *Venue:* Desert Ridge Resort, Phoenix, AZ USA *Contact:* Brenda Kinney, AIUM, Ph: 1-301-498-4100; E-mail: bkinney@aium.org; Website: www.aium.org

Tues 22 Jun 2004 - 2 days Third World Congress in Fetal Medicine *Venue:* Nicosia, Cyprus *Contact:* www.fetalmedicine.com

Sat 31 Jul 2004 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

Tues 31 Aug 2004 - 4 days 14th World Congress on Ultrasound in Obstetrics and Gynecology *Venue:* Stockholm, Sweden *Contact:* Ms S Johnson, Ex Dir ISUOG, 3rd Fl, Lanesborough Wing, St Georges Hospital Medical School, Cranmer Terrace, London SW 17 ORE, UK. Ph: 44 20 8725 2505; Fax: 44 20 8725 0212; Email: johnson@sghms.ac.uk

Sep 2004 - 4 days ASUM 2004. 34th Annual Scientific Meeting of the Australasian Society for Ultrasound in Medicine *Venue:* Sydney, Australia *Contact:* ASUM, 2/181 High Street, Willoughby NSW 2068. Ph: 61 2 9958 7655; Fax: 61 2 9958 8002; Email: asum@asum.com.au

Fri 8 Oct 2003 - 2 days Research & Developments meeting. The Fetal Medicine Foundation *Venue:* London *Website:* www.fetalmedicine.com

Wed 8 Dec 2004 - 3 days 36th BMUS Annual Scientific Meeting and Exhibition *Venue:* Manchester, UK *Contact:* The British Medical Ultrasound Society, Ph: 44 0 20 7636 3714, Email: secretariat@bmus.org

May 2005 - 3 days Australian Sonographers Associations 12th Annual Conference *Venue:* Brisbane *Contact:* Elaine Trevaskis, Ph: 03 9585 2996

Jun 2005 IX World Congress of Echocardiography and Vascular Ultrasound *Venue:* Milan, Italy *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

Sun 19 June 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; E-mail: bkinney@aium.org; Website: www.aium.org

Sat 30 Jul 2005 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

28th Sep - 2nd Oct 2005 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

May 2006 - 3 days Australian Sonographers Associations 13th Annual Conference *Venue:* Canberra *Contact:* Elaine Trevaskis, Ph: 03 9585 2996

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, MD, Congress Secretariat, Ph: 82 2 760 2515; Fax: 82 2 743 6385; Email: choibi@radcom.snu.ac.kr; Website: <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

Sep 2006 - 4 days ASUM 2006. 36th Annual Scientific Meeting of the Australasian Society for Ultrasound in Medicine *Venue:* AUSTRALIA / NZ tba *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 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

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

Sep 2007 - 4 days ASUM 2007. 37th Annual Scientific Meeting of the Australasian Society for Ultrasound in Medicine *Venue:* AUSTRALIA / NZ tba *Contact:* ASUM, 2/181 High Street, Willoughby, NSW, 2068. Ph: 61 2 9958 7655; Fax: 61 2 9958 8002; Email: asum@asum.com.au

Sept 2009 - 5 days ASUM hosts: WFUMB 2009 World Congress in Sydney, Australia *Venue:* Sydney Convention and Exhibition Centre *Contact:* Dr Caroline Hong, ASUM CEO, ASUM Head Office, 2/181 High Street, Willoughby NSW 2068, Sydney, Australia. Email: carolinehong@asum.com.au or asum@asum.com.au

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Guidelines for authors

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

ORIGINAL RESEARCH

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

QUIZ CASES

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

CASE REPORTS

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

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

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

CALENDAR ITEMS

Organisers of meetings and educational events relevant to medical ultrasound are invited to submit details for publication in the *Ultrasound Bulletin*. Each listing must contain: activity title, dates, venue, organising body and contact details including name, address, phone number, facsimile number (where available) and email address (where available). Notices will not usually be accepted for courses run by commercial organisations.

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

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Manuscripts

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

- Font size: maximum 12, minimum 10
- Double spacing for all pages
- Each manuscript should have the following components:

Title page, abstract, text, references, tables, legends for illustrations.

- Title Page should include the following:
 - Title of manuscript, the full names of the authors listed in order of their contribution to the work, the department or practice from which the work originated, and their position.
 - Corresponding author's name, contact address, contact telephone number and facsimile number (where available) for correspondence.
- Abbreviations may be used after being first written in full with abbreviation in parentheses.
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1. In-text citation: Superscript
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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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All 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. All images sent must have all personal and hospital or practice identifiers removed. Please do not embed images in text. Separate images are required for publication purposes. Figure legends must be provided for the images. Hard copy images should be presented as glossy print or original film. Any labelling should be entered on the front of the glossy print using removable labels (eg Letraset). (Please send one copy of illustrations without labelling as this can be added electronically prior to publication.) On the back of the print include the author's name, figure number and a directional arrow indicating the top of the print. Digitised graphics should be supplied as JPG or TIFF files on PC formatted 3.5" diskette or CD, which must be clearly labelled with the author's name and the names of the image files.

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