

Expanded Newborn Screening Using Tandem Mass Spectrometry

Clinical A/Prof Samuel Rajadurai, Head, Department of Neonatology, KK Women's and Children's Hospital Programme Director of the National Expanded Newborn Screening Programme

The National Expanded Newborn Screening Programme is a collaboration set up by the SingHealth Group and the National Healthcare Group, with the help of the Ministry of Health, Singapore. This programme involves introducing an additional newborn screening test called The Metabolic Screen. The metabolic screen tests newborn babies for a group of disorders called Inborn Errors of Metabolism (IEM). About 25 to 30 IEMs can be screened for from a blood spot using a novel technology called Tandem Mass Spectrometry (TMS).



PerkinElmer Wallae Mass Spectrometer

A TMS is an analytic instrument that separates and determines the quantity of ions in a sample on the basis of their mass-to-charge ratios. Many disorders including amino acidopathies, organic acidurias, urea cycle defects and fatty oxidation defects can be detected by TMS. These were not included in the past screening programmes in Singapore. Previously, newborn screenings were done only for G6PD deficiency, congenital hypothyroidism and hearing impairment.

The metabolic screen is performed between the second and fifth postnatal day, when the baby has established full oral feeds with breast milk or a formula. Three to four drops of blood are obtained by heel prick onto a special filter paper. This blood-spot card is dried in room air and sent to the National Expanded Newborn Screening Laboratory located at KK Women's and Children's Hospital. The results of the screening test are available after two working days.

The metabolic screen test using TMS has a high predictive value with a sensitivity of 96%, specificity 99.8% and recall rate 1.5 - 2%. Patients with grossly abnormal screening tests are referred to metabolic

specialists for further management. Those with borderline abnormal results are recalled for a repeat screening test.

The patients who are confirmed to have IEMs are managed at 2 centres in Singapore. One at NUH, is headed by A/Prof Denise Goh, a paediatrician and board-certified metabolic geneticist. The other, at KKH, by Associate Consultant Dr Tan Ee Shien and Visiting Consultant Dr Teo Siak Hong. The treatment of the IEM depends on the type of the metabolic abnormality. Disorders of amino acid are managed by dietary restriction of the amino acids that the body cannot break down; for example, restriction of Phenylalanine in Phenylketonuria (PKU) and Leucine, Isolucine and Valine in Maple Syrup Urine Disease (MSUD). Organic acidurias are treated by dietary restriction of amino acids and oral carnitine supplementation. Ureas cycle disorders are treated with protein-restricted diet, sodium benzoate and arginine supplementation.

The screening programme was launched in public hospitals in July 2006 and in the private hospitals in October 2006. Out of the 18,000 babies screened, 4 cases of IEMs have been detected, giving an

01

Medical Update
Expanded Newborn Screening
Using Tandem Mass Spectrometry

09

Service Packages & Updates
Children On The Move
Exercise Programme for Children
with Special Needs

03

Medical Update
Comprehensive Pain Management
- SGH Pain Management Centre

10

Service Packages & Updates
Athlete Medical Screening
Packages at CGH

06

Medical Update
Hearing Rehabilitation - An Update

11

Continuing Medical Education

08

Service Packages & Updates
Singapore's First Advanced Infant and Paediatric
Simulators Arrive at KK Women's and Children's Hospital

12

Continuing Medical Education /
Hotline Numbers / Advisory Board

incidence of one in 4,500. The IEM cases detected were Maternal Carnitine Uptake Defect, Medium Chain AcylCoA Dehydrogenase Deficiency (MCAD), Glutaric Aciduria Type 1 and Methylmalonic Acidemia. The four infants were managed optimally before the occurrence of metabolic crisis and life threatening complications were prevented. TMS is also used to monitor patients who have IEMs on treatment for conditions such as Phenylketonuria, organic acidurias and primary carnitine deficiency.



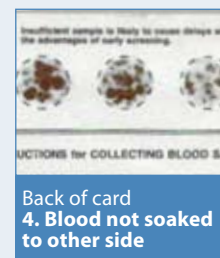
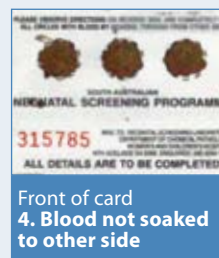
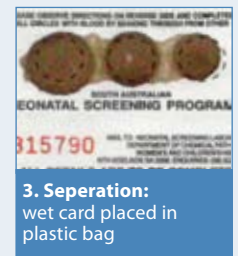
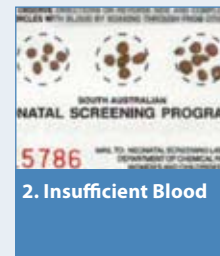
Clin A/Prof Samuel Rajadurai, Head, Department of Neonatology, KKH and Programme Director of the National Expanded Newborn Screening Programme checks a newborn in the hospital's Neonatal Intensive Care Unit.

“Many of these conditions, if undiagnosed or untreated, can result in early death or permanent neurodevelopmental sequelae. The metabolic screen identifies babies who may have IEMs, often before they develop symptoms of the disease. Early diagnosis and appropriate treatment can reduce the risk of death and developmental delay in majority of the cases,” said Clinical A/Prof Samuel Rajadurai, Head, Dept of Neonatology, KKH and Programme Director of the National Expanded Newborn Screening Programme

Clinical A/Prof Samuel Rajadurai is the Programme Director and A/Prof Denise Goh from NUS and Consultant, Dept of Paediatrics, NUH is the Co-Programme Director. A/Prof Denise Goh who is a Paediatric Geneticist and a Metabolic Specialist is also a Visiting Consultant to KKH. Dr Tan Ee Shien, Associate Consultant, Medical Technologists (Ms Sherry Poh and Ms Yeo Shu Jun) and Principal Scientific Officer Ms Clare Hart and Laboratory Manager Ms Lee So Chow are the other dedicated team members of the Expanded Newborn Screening Programme.

To ensure that the medical community was well informed, prior to launch of the programme, public lectures were given by Clinical A/Prof V S Rajadurai (Programme Director) and A/Prof Denise Goh (Co-Programme Director) in all the public and private hospitals. The target audience was paediatricians, neonatologists and nurses. An informative and well-designed brochure ensured that the public was kept well informed and it also facilitated the dissemination of information by medical personnel. This is available in English, Malay, Chinese and Tamil and is given out free to all hospitals and clinics. To contain cost, the test has been priced at \$70 to private patients and \$35 to subsidised patients. Individual hospitals include a phlebotomy fee on top of these test charges. To further contain cost, the programme has also picked up the cost of the repeat tests and diagnostic tests.

Improper Samples



Comprehensive Pain Management – SGH Pain Management Centre

Dr Jane George, Senior Consultant, Pain Management Centre
Senior Consultant, Anaesthesia & Surgical Intensive Care, Singapore General Hospital

Pain is one of the primary reasons for seeking medical attention yet surveys have indicated that a significant proportion of the general population live with chronic pain. In Europe, one in five adults suffers from chronic pain.⁽¹⁾ In the World Health Organization Collaborative Study of Psychological Problems in General Health Care, conducted in 15 centres in Asia, Africa, Europe, and the Americas the prevalence of persistent pain was found to be an average of 22%.⁽²⁾

Pain is a complex medical problem that can have profound effects on physical and mental well-being. Pain is deemed as chronic when it has lasted for longer than three months and chronic pain should be considered a disease and not just a symptom. It can outlast the primary cause such as in complex regional pain syndrome (CRPS) where the pain continues even after healing of the injury.

The complexity of the problem of pain has made it necessary for doctors to specialise in pain management. The goal of the pain management specialist is to help manage the pain and return the patient to a functional and reasonable quality of life. Often a multidisciplinary approach works best in the treatment of pain and setting up of pain management centres has been recognised internationally as a medical landmark phenomenon. Often, pain management clinics provide relief to people with chronic and acute pain when every other part of the health care system has given up.

The Pain Management Centre at the Singapore General Hospital will open towards the end of 2007. Currently, the pain clinic and staff are already providing care for numerous hospitalised and ambulatory patients with chronic and cancer pain.

The Pain Centre can manage various types of somatic and neuropathic pain problems, including:

- Cancer related pain
- Back and neck pain
- Orofacial pain
- Myofascial pain and Fibromyalgia
- Neuropathic pain syndromes
 - Trigeminal neuralgia
 - Peripheral neuropathy
 - Diabetic peripheral neuropathy
- Complex regional pain syndromes
- Post surgical pain syndromes
- Post injury chronic pain
- Central pain
- Spasticity

Our approach begins with a comprehensive initial assessment to ascertain the type, cause and severity of pain as well as the functional and psychological disability. A multi-modal treatment plan is then formulated and individually tailored for the patient.

Analgesics include paracetamol, NSAIDs, Tramadol, Opioids and topical agents. Adjuvant drugs are needed especially in neuropathic pain and may include anti-convulsants, anti-depressants, membrane stabilisers and muscle relaxants.

Interventional pain procedures are used for specific conditions as indicated.

Sometimes it is not possible to alleviate the pain completely but reduce it to a level which allows reasonable function. Often it is not one modality of treatment that works but a combination of medical, interventional, psychological and rehabilitation techniques.

When a patient has difficulty in managing pain problems, the pain management team will hold a multidisciplinary conference to develop an individualized treatment plan involving various disciplines.

Interventional Pain Procedures

These procedures are performed under sterile technique using fluoroscopic guidance

Some of the procedures we perform include:

1. Facet joint and medial branch blocks
2. Sacroiliac joint injections
3. Epidural injections
4. Radiofrequency neurotomy for facet and sacroiliac joint
5. Epidural neuroplasty and adhesiolysis
6. Implanted intrathecal or epidural administration systems
7. Implanted spinal cord stimulators
8. Sympathetic blocks like coeliac plexus, lumbar sympathetic and stellate ganglion
9. Cranial nerve and ganglion blocks
10. Peripheral Nerve and Plexus blocks and indwelling catheters

Epidural Steroid Injection

Steroids such as dexamethasone or triamcinolone are administered via caudal, interlaminar or transforaminal routes into the epidural space.^(3,4) using fluoroscopic guidance. Patients who benefit are those with radicular symptoms caused by local inflammation due to prolapsed or damaged discs, facet joint hypertrophy or trauma.

Relief is not instantaneous, but most patients report initial benefit in two to five days and maximum relief in one or two weeks after the injection.

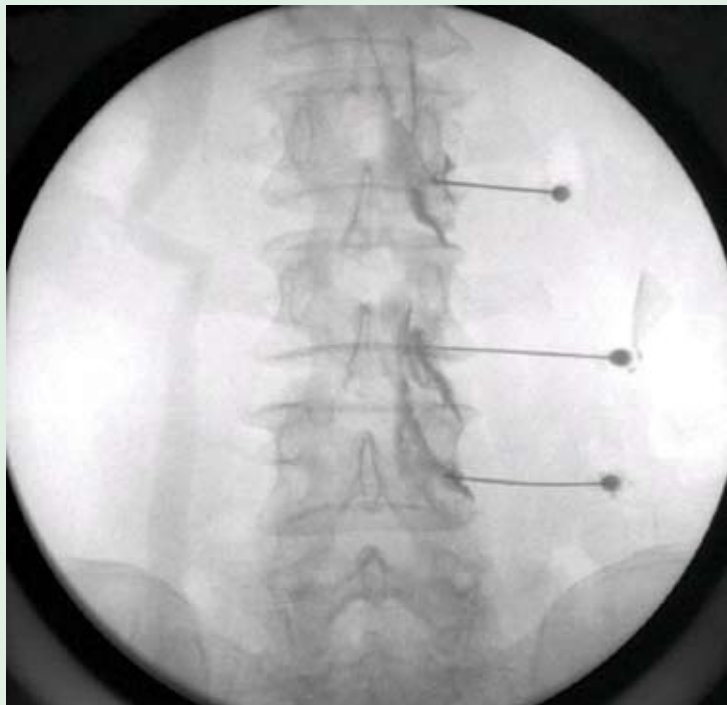
Properly performed, controlled diagnostic selective nerve root blocks can also be an effective technique in evaluating patients with multilevel pathology to help identify the pain generator. Surgery can then be performed in selected patients at the appropriate level.

Rarely complications include dural puncture, infection, intravascular injection, air embolism, vascular trauma, particulate embolism, cerebral thrombosis, epidural hematoma, neural or spinal cord damage, and complications related to administration of steroids. These complications are minimized by careful technique, trained specialists and fluoroscopic guidance.

Facet Joint Blocks

Facet joint pain may be managed by intraarticular injections of steroids, medial branch blocks or radiofrequency neurotomy of medial branches.^(5,6) Utilizing traditional radiofrequency neurotomy techniques of medial branches in the cervical and lumbar regions, the evidence is strong for short-term and moderate for long-term relief.

Facet joints have been implicated as responsible for spinal pain in 15% to 45% of patients with low back pain, 54% to 67% of patients with neck pain and 42% to 48% of patients with thoracic pain.⁽³⁾



Fluoroscopic Image of Transforaminal Epidural Steroids



Intrathecal Porta-Cath System Placement under Fluoroscopic Guidances

Peripheral Nerve Blocks - Occipital nerve block

Occipital nerve block is most frequently used to diagnose and treat a type of headache most likely due to occipital neuralgia or an irritation of the Greater or Lesser Occipital Nerve. This treatment has brought relief to many patients who suffer from pain caused by occipital tension headaches.

Pain relief is usually felt fairly quickly after the injection. When a local anesthetic and steroid are used, there is some initial pain relief that may then dissipate when the local anesthetic has worn off. Additional pain relief is felt roughly 48 hours later when the steroid medication begins to take effect.

Implanted Spinal Portal System

A spinal portal system is an implanted system which allows access to the epidural or intrathecal space. A port is a small disc with a raised "septum" in the center. It is easily felt through the surface of the skin. The port is usually implanted under the skin on the chest. Attached to the base of the port is a narrow catheter. The catheter runs beneath the skin from the epidural or intrathecal space to the port. The entire system is implanted under the skin reducing the risk of infection greatly. The septum is made of self sealing material which may be punctured many times and it reseals itself instantly.

The intrathecal space is more commonly used to administer drugs in this way. It is entered using a needle guided by fluoroscopy. The catheter is then inserted through the needle and the tip positioned near the nerves corresponding to the areas of pain. Drugs infused continuously include local anaesthetics, morphine and others.

This system is more commonly used to administer drugs to control severe cancer pain which failed to be controlled by other measures.

Intrathecal Programmable Pump

The intrathecal programmable pump is an implanted device used to deliver local anaesthetics and opioids directly into the cerebrospinal fluid. The system consists of an infusion pump, a spinal catheter, and an external programmer.

This treatment has brought relief to many patients who suffer from severe cancer pain and also from chronic and severe spasticity of spinal cord origin.

The pump is programmed immediately upon placement, before leaving the surgical suite. The effect of the medication occurs within minutes to hours, depending on the choice of medication placed in the pump.



Implantable Programmable Intrathecal Catheter & Pump

Spinal Cord Stimulator

Spinal cord stimulation can relieve chronic pain in the back, arms or legs. It works by electrically stimulating the spinal cord. Instead of pain, the patient feels a tingling or buzzing sensation.

The spinal cord stimulation system consists of several parts:

- A battery-powered device called a pulse generator is implanted in the back or abdomen. It generates low-voltage electrical stimulation at the spinal cord through an insulated wire lead.
- A lead is implanted in the epidural space near the nerves that correspond to the patient's areas of pain.
- An external programmer allows tuning of therapy within physician prescribed parameters to address different levels and types of pain

The spinal cord stimulator may be used for patients with one of the following conditions who have not responded well to more conservative therapies:

- Complex Regional Pain Syndrome
- Failed Back Syndrome
- Phantom Limb Pain
- Other Neuropathic Pain Syndromes

Spinal Cord Stimulation involves a two part process - implantation of temporary spinal cord stimulator trial leads and permanent implantation of a spinal cord stimulator generator if the trial is successful.

Conclusion

Effective pain management involves multiple modalities and often a multidisciplinary approach. The staff at the Pain Management Centre at the Singapore General Hospital has a vision and a mission to address effectively and comprehensively, the problem of pain among our patients.

References

1. Pain in Europe – A Report
2. Gureje O, M Von Korff, Simon GE, Gater R. Persistent Pain and Well-being. *JAMA* 1998; 280:147-151
3. Boswell MV, Shah RV, Everett CR, Sehgal N, McKenzie-Brown AM, Abdi S, Bowman RC, Deer TR, Datta S, Colson JD, Spillane WF, Smith HS, Lucas- Levin LF, Burton AW, Chopra P, Staats PS, Wasserman RA, Manchikanti L. Interventional techniques in the management of chronic spinal pain: Evidence based practice guidelines. *Pain Physician* 2005; 8:1-47. ISSN 1533-3159
4. Boswell M, Hansen H, Trescot A, Hirsch J. Epidural steroids in the management of chronic spinal pain and radiculopathy. *Pain Physician* 2003; 6:319-334.
5. Niemisto L, Kalso E, Malmivaara A, Seitsalo S, Hurri H. Cochrane Collaboration Back Review Group. Radiofrequency denervation for neck and back pain: a systematic review within the framework of the Cochrane collaboration back review group. *Spine* 2003; 28:1877-1888.
6. Slipman CW, Bhat AL, Gilchrist RV, Isaac Z, Chou L, Lenrow DA. A critical review of the evidence for the use of zygapophysial injections and radiofrequency denervation in the treatment of low back pain. *Spine J* 2003; 3:310-316.
7. Boswell MV, Trescot AM, Sukdeb Datta et al. Interventional Techniques: Evidence-based Practice Guidelines in the Management of Chronic Spinal Pain. *Pain Physician* 2007; 10:7-111

Hearing Rehabilitation - An Update

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Hearing rehabilitation has come a long way over the years in terms of hearing aid technology. As we move into the digital era where sound quality matters, increasingly more options are available to the end users. Apart from quality of sound; other considerations such as ease of usage, minimising inconvenience and aesthetic appeal have led the industry to develop a whole range of hearing aids made available to the mass market.

I) Hearing Aids

A comprehensive range of services includes:

- Complete audiological evaluation and counselling services
- Professional hearing aid selection and fitting by experienced hearing aid audiologists
- Provision of full spectrum of custom-made hearing aids such as the Completely-In-The-Ear (CIC), In-The-Canal (ITC), In-The-Ear (ITE) and Behind-The-Ear (BTE) models.
- Comprehensive after-fitting services such as hearing aid repair and fine-tuning
- Sale of related-accessories such as hearing aid batteries, dehumidifier, custom-made swim plugs, custom-made earplugs, etc.

In order for patients to reap maximum benefits from hearing aids, the



patient and/or family members should be informed about the type of technologies available and their limitations. This critical, value-adding step can only be performed by a professional clinician who possesses a sound knowledge of the advantages and disadvantages of different technologies and their application in terms of performance, features and fit in accordance to the hearing needs of each patient. The other key challenge is to present this information to patients in a simple, easy-to-understand format.

Changi General Hospital Hearing Aid Service

Since 2002, Changi General Hospital (CGH) has been offering in-house hearing aid service as part of her continuous effort to provide prompt and comprehensive hearing rehabilitation for persons with hearing loss. Today, this service has extended beyond prescribing appropriate hearing aids, proper pre-fitting counselling and after-fitting care. With the addition of new otology services such as Tinnitus Evaluation and Rehabilitation Programme (TERP), vertigo management as well as Otologic Implantation, an entire whole spectrum of instrumentation is now available in CGH hearing aid service.

At the CGH Hearing Aid Clinic, in-house audiologists will help patients understand their hearing capabilities and hearing loss type and the various digital technologies available (see section on counselling for new hearing aid users).

Counselling for New Hearing Aid Users

Audiologists can help patients to understand:

- their hearing capabilities and hearing loss type. This will help patients to correlate their hearing configuration and the influence on speech discrimination in various situations. The advantages and limitations of various hearing aid styles such as size, power, ease of insertion and removal, technology limitation, avoidance of occlusion, feedback issue as well as financial cost will be explained.
- various digital technologies such as
 - noise reduction which helps to reduce stationary noise and upward spread masking effect.
 - feedback suppression which allow the possibility of implementing a higher gain setting with a bigger venting
 - adaptive directional microphone which improve signal-to-noise ratio and result in better speech discrimination in noisy environment.

Digital technology with multi-channels signal processing, noise reduction and directional have been proven to improve speech discrimination in noisy environment. However, many patients will be balancing cost against the advantages of the complex technologies. Thus, it is important to help patients manage and adjust their expectations accordingly.

Occlusion and Own-Voice Issues – new solutions for an age-old problem

Changes in the user's perception of his/her own voice is one of the most common complaints of hearing aid users. First-time users often comment that their voices sound unnatural and sound as if they were in a "barrel". It is also not uncommon for users to comment that their chewing sound

is so loud that they were unable to follow the conversation around the dining table. This problem is the result of occlusion and effect of amplification of one's own voice.

Occlusion is the main cause of this "unnatural own voice" problem especially for those patients with high frequency hearing loss and good low frequency hearing. It is caused by the resonance of sound when the ear canal is blocked by either the hearing aid itself e.g. CIC or the custom made ear-mould. The resonance increases the sound pressure level at the eardrum by as much as 20 to 30 dB. This occlusion problem has become more common among users of smaller hearing aids such as the CIC.

Mild-to-moderate high frequency sensorineural hearing loss patients often reject hearing aids because of this occlusion problem. A direct way to solve or minimise this occlusion problem is to reduce the blocking of the ear canal when the patients are using hearing aids. To address this issue, CGH's hearing aid clinic started offering the following solutions:

• **Open Fitting Hearing Aids**

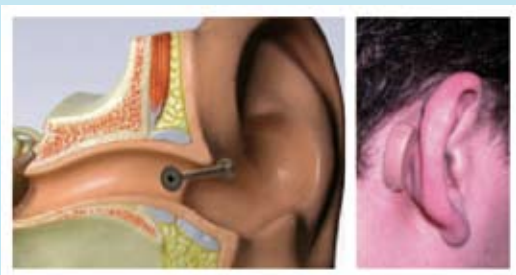
These are Behind-The-Ear (BTE) digital hearing aids connected to a highly ventilated off-the-shelf ear-tip. The relatively large ventilation will greatly reduce the occlusion effect. Together with advanced digital signal processing capabilities such as noise reduction, feedback suppression and directional microphone, speech intelligibility is significantly improved in noisy environment such as restaurants.

This group of hearing aids usually have smaller housings as compared to conventional BTE and are usually operated with smaller-sized battery. However, as the aids are worn behind the ears, this group of aids are not popular among younger patients due to aesthetic reasons.

• **Retro-X Semi-Implant Hearing Aids**

This semi-implant hearing aid was designed for patients with mild-to-moderate high frequency sensorineural hearing loss. It consists of a titanium tube and a hearing processor. The titanium tube is implanted

in the soft tissue of the outer ear. It is not in direct contact with the cartilaginous skeleton of the ear or with the bone of the mastoid. Once the wound has



A First in Singapore & Asia

The first Retro-X implantation in Singapore, as well as Asia, was performed in Changi General Hospital in November 2006 by Dr Eng Soh Ping. As the total cost of the implant procedure and the hearing processor is very close to the high-end digital hearing aids in the private market, more patients will be expected to receive this implant and reap its benefits in the near future.

fully healed which usually takes about a month, the hearing processor is inserted into the retroauricular end of titanium tube and worn behind the pinna and the mastoid. The hearing device is a multi-channels digital processor that can be programmed to individual hearing loss pattern like any other conventional digital hearing aids. With a truly open-ear device, patients not only avoid occlusion problem but also preserve the natural ear effect such as outer ear resonance and directional hearing.

II) Other types of instrumentation available

Tinnitus

Part of the treatment would often involve sound therapy and instrumentation including sound generators. Various types of digital sound generators can be programmed to match the tinnitus pitches as follows:

- 4-channel behind-the-ear digital noise generator that can be configured according to the pure-tone audiometry data in order to realise an audible masking noise.
- 2-channel behind-the-ear digital hearing aid with masking noise feature designed especially for those who require hearing amplification and tinnitus masking.
- 4-channel modular CIC digital noise generator that can be fitted deep in the canal.

The Tinnitus Evaluation & Rehabilitation Programme (TERP) at CGH was introduced in CGH in June 2006 to manage tinnitus sufferers. It involves a 6-month treatment protocol that allows the patient to receive a holistic therapy from multi-disciplinary sources which includes a tinnitus counsellor, ENT doctor and a psychologist.

Vertigo

Meniere's disease, a common cause of vertigo, is caused by endolymphatic swelling or hydrop of the inner ear. The Meniett Device is a recent development in the management of Meniere's disease. The ENT surgeon performs a simple procedure to place a ventilation tube in the ear drum and through a tube connected to an ear piece placed in the outer ear, the Meniett device delivers controlled, low-pressure air pulses. The energy of the low-pressure pulses displaces the excess inner ear fluid, which normalises the symptoms of the disease.

Singapore's First Advanced Infant and Paediatric Simulators arrive at KK Women's And Children's Hospital



(2nd from right) Dr Janil Puthuchery, Director, Paediatric Simulation Training Centre demonstrates how the mannequin simulates vital signs, to (from left) A/Prof Ivy Ng, KKH CEO; Prof K Satkunanantham, Director of Medical Services, Ministry of Health; and A/Prof Lim Lean Huat, from the SingHealth Board of Directors

KK Women's and Children's Hospital (KKH) now makes new simulation technology an integral part of its training programmes with the set up of the Paediatric Simulation Training Centre (PSTC) on 6 July 2007. The centre will feature advanced infant and paediatric simulators, the first to be used in Singapore.

The centre was officially opened by Prof Satkunanantham, Director, Medical Services, Ministry of Health, in conjunction with the 3rd KKH Annual Scientific Meeting.

The state-of-the-art equipment will provide new training opportunities with remarkably lifelike infant simulators. For example, they can re-enact clinical problems such as having an airway swell from an allergic reaction till it shuts.

In addition to the mannequins, PSTC also has two simulation labs where various pieces of biomedical equipment and facilities are available to mock-up any care area in the hospital.

New courses will be developed to take advantage of the simulation technology. Currently, in line with KKH's role as a training centre for basic and advanced life support for neonates and children, PSTC's primary focus will be resuscitation. Other courses are being developed in anaesthesia, paediatrics, and critical care, for a start.

The simulators provide the maximum education out of scarce opportunities, especially in high risk and low volume areas of paediatric acute medicine, critical care, anaesthesia and emergency medicine. With the new simulators, KKH aims to enhance medical expertise, patient safety and positive outcomes in the long-run.

Children on the Move

Exercise Programme for Children with Special Needs

KK Women's and Children's Hospital is the first in Singapore to present 'Children on the Move', a movement programme for children aged four years old and above. The programme caters to children who encounter difficulties learning and performing fundamental movement skills appropriate for their age, such as running, jumping, skipping, throwing and catching.

Customised to each child's individual needs, it is designed to improve the child's physical fitness and fundamental movement skills through participation in physical activities in a fun, positive and supervised environment.

Children who will benefit from the exercise programme fall into three groups:

- Children with learning and neuromuscular disabilities
- Children with Developmental Coordination Disorder (DCD)
- Children with medical conditions but no movement challenges or disabilities

The programme aims to:

- Provide children with special needs the opportunity to participate in physical activities in a fun and supervised environment
- Improve the child's fundamental movement skills, coordination and physical fitness
- Improve the child's confidence and self-esteem
- Improve disease management through exercise training

Who is it for?

The programme is suitable for any child aged four years old and above, with medical conditions such as:

- Autism
- Respiratory problems
- Mild mental retardation
- Stable heart conditions
- Diabetes
- Poor fitness after a major illness (e.g. cancer or surgery etc)
- Asthma
- Musculoskeletal conditions

- Obesity
- Developmental dyspraxia
- Developmental coordination disorder

Programme Outline

- Entry assessment (fitness and motor skills) carried out by the kinesiologist (human movement specialist) and exercise physiologist. A report will be provided to the parent.
- A minimum of 12 weekly exercise sessions, one-to-one coaching for at least the first six sessions. Group sessions (trainer ratio 1:2, 1:3 or 1:4) may be considered for suitable children.
- Home exercise plan will be given to parents.
- Final evaluation outcome will be provided to parents and referring doctor at the end of the programme.

Appointments

To make an appointment, please call Central Appointments: 6294 4050.

- A doctor's referral is needed for the child to enrol in the programme. Alternatively, an appointment can be made for the child to see the doctor at the Sports Medicine Clinic.
- For children who are currently seeing a paediatrician in KK Hospital, referral can be made through the child's paediatrician. No consultation with the sports physician is required.



Hula hoops and bean bags are used as equipment to help children improve their motor skills

Athlete Medical Screening Packages at CGH

The increase in the number of participants in extreme sports events such as triathlons and marathons has led to a surge in the demand for sports pre-participation screening.

Recognising the importance of sports pre-participation screening, Changi Sports Medicine Centre (CSMC) has proactively initiated the development of the Athlete Medical Screening Packages. These packages provide appropriate medical screening to exclude risk factors and are specially tailored for active individuals who participate in strenuous / extreme sports.

About the Packages

The Athlete Medical Screening Packages at Changi General Hospital draws from the multidisciplinary expertise of a range of experts including sports physicians, cardiologists and multiphasic screening physicians to obtain a balance of expert opinions.

The highlights of the pre-participation screenings are the musculoskeletal and cardiorespiratory components, particularly the 2D Echo test which can better detect and provide more details on any underlying heart conditions that can go undetected by a normal ECG.

The packages are for everyone, from the weekend warriors to professional athletes. They are also tailored to various age groups from young adolescent athletes and younger adults (aged between 15 to 35) to older adults of >35 years to screen for the most common conditions which may be a barrier to participating in vigorous sports or pose a danger when participating in vigorous sports. Individual tests may be included based on the risk profile of the individual.

Athlete Medical Screening Packages at CGH

Package/Items	Classic Package 15-35 years old	Deluxe Package 15-35 years old	Classic Package Above 35 years	Deluxe Package Above 35 years
Medical History	+	+	+	+
Physical Examination	+	+	+	+
Resting ECG	+	+	+	+
Chest X-ray			+	+
2 D Echo	+	+		+
Stress Test (Treadmill)		+	+	+
Lipid Panel	+	+	+	+
Renal Panel I (Urea, Na, K,Cl, Creatinine, Glucose)	+	+	+	+
Full Blood Count	+	+	+	+
Liver , ALT	+	+	+	+
Urine FEME	+	+	+	+
Price : Individual	\$350	\$480	\$350	\$500

Recommendation : To repeat ECG annually for those under 35 years

To repeat 2D echo after 5 years if the first 2D echo is negative.

To register, please contact our Appointment Centre at Tel: 6850 3333 for an appointment.

Cardiology Update @ Singapore 2007



National Heart
Centre Singapore
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National Heart Centre Singapore
6 - 7 October 2007
National Heart Centre Lecture Theatre

About Cardiology Update @ Singapore 2007

The pace of modern medicine is such that individual doctors, both general internists as well as cardiologists, find it difficult to keep up with the rapid explosion of knowledge generated by trials and basic research. Yet it is essential to have sufficient core knowledge of cardiology and its related medical subspecialties to practice as "safe" doctors. Cardiology Update @ Singapore 2007 fulfills this need by providing a forum that summarises key new knowledge each general cardiologist, cardiology fellow or internist must know, in a concise and usable format.

Lectures will provide a succinct summary of practical information focusing on new knowledge generated from trials, new guidelines or new discoveries that challenge existing paradigms and have a major impact on practice. New and effective treatments, their limitations, indications and contradictions will be emphasised. Treatments found to be ineffective will also be summarised briefly.

Interactive sessions on data interpretation, echocardiography, cardiac catheterisation, ECGs and nuclear imaging are specially designed for those taking cardiology examinations.

Who should attend

Cardiologists, cardiology fellows, medical officers, internists and general physicians with special interest in cardiology

Registration & Enquiries

Registration form and updated programme can be found at www.nhc.com.sg
Please send your registrations to Ms Azizah Nordin at fax number below.

Tel : +65 6236 7441
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NHC GP Heart Care Symposium Women & Heart Disease



Date: **27 October 2007 (Saturday)**
Time: **1 to 4pm**
Venue: **Grand Copthorne Waterfront Hotel**

Course Directors: **Dr Ding Zee Pin & Dr Tan Ju Le**
Course Coordinator: **Ms Oh Seow Fong (Tel: 6236 7420)**
Email: **nhccme@nhc.com.sg**

CME points: To be confirmed

SingHealth HOTLINE NUMBERS

GPEP HOTLINE : 6557 2233

SOC FAST TRACK APPOINTMENT CONTACT NUMBERS

DIRECT WARD REFERRAL CONTACT NUMBERS

	CGH Changi General Hospital	6850 3333
	SGH Singapore General Hospital	6321 4402
	KKH KK Women's and Children's Hospital	6294 4050
	NCCS National Cancer Centre Singapore	6436 8288
	NHC National Heart Centre Singapore	6436 7848
	SNEC Singapore National Eye Centre	6322 9399

	CGH Changi General Hospital	6850 1648
	SGH Singapore General Hospital	6321 4822
	KKH KK Women's and Children's Hospital	6394 1183

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