

## Recent advances in the management of back and neck pain

Dr Tan Seang Beng

### New developments in the management of neck and back pain

Pain management has improved tremendously in recent years allowing physicians to offer patients with partial if not complete pain relief.

Pain management techniques for back or neck pain can be categorized in terms of their invasiveness: (1) non-invasive non-drug pain management, (2) non-invasive pharmacologic pain management and (3) invasive pain management. In recent years, many factors have also contributed to the development of pain management including improved diagnosis through radiological evaluation (Figure 10), improved pain management approach, improved physical therapy programmes, the use of minimally invasive spinal surgery, advances in spinal instrumentation and the use of artificial disc replacement procedure.

1. Plain Radiographs (AP and Lateral) Erect
2. Right and Left Obliques
3. Flexion and Extension Stress Lateral Radiographs
4. MRI
5. CT/Myelography
6. Bone Scans
7. Discography
8. Facet / Nerve root injections

Figure 10. Improved diagnosis through radiological evaluation

### Discogenic back pain/lumbar disc pain

Except for chronic headaches, back pain is the most prevalent pain complaint.

Back pain due to degeneration of the lumbar intervertebral discs is called discogenic back pain or lumbar disc pain. The exact cause is not clear and the vast majority of degenerative discs cause no symptoms at all. To establish the sources and possible

causes, provocation discography is used to reveal internal disk disruption, characterized by multiple annular tears.

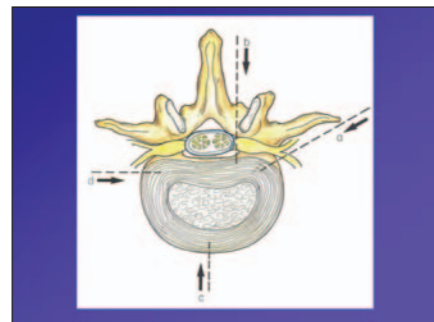


Figure 11. Percutaneous endoscopic lumbar discectomy

### Discogenic back pain management

A multitude of invasive pain management therapies have been used to treat neck and back pain including trigger point injections, intra-articular facet injections, medial branch facet blocks, radiofrequency facet denervation, nerve root blocks, lumbar epidural injections, cervical epidural injections, intradiscal electrothermoplasty (IDET), sympathetic blocks, sacroiliac joint blocks, botox injections and percutaneous discectomy.

Facet joint injections, for example, consist of injecting cortisone derivatives and/or anaesthesia in the facet joint to reduce inflammation and pain. Facet joint degeneration or osteoarthritis can be caused by a combination of aging, pressure overload of the facet joints, and injury. In patients suffering from neurogenic pain, nerve root blocks may be used in the attempt to anaesthetize the desired nerve. Alternatively, a new technique known as IDET is used to destroy the invading sensory nerves resulting in the reshaping and strengthening of the disc wall.

IDET was first introduced in 1997 and has been performed extensively since then.

Percutaneous discectomy is another minimally invasive procedure used to reduce the pressure within the herniated disc. It

involves making a small incision in the back of the patient and with the aid of x-ray pictures and a video screen/endoscope as a guide, tissues are removed from the centre of a disc. There are several techniques involved but the conventional laminectomy and discectomy, and microdiscectomy remain the gold standard.

Percutaneous endoscopic lumbar discectomy (PELD) is a new technique for the decompression of the lumbar disc space and removal of nucleus pulposus via a posterolateral approach (Figure 11). Some of the advantages of PELD include performance in local anesthesia, atraumatic extraspinal approach, reduced time of hospitalization and postoperative morbidity as well as the reduced time of work incapability.

Other invasive pain management therapy includes lumbar spinal fusion surgery where bone is placed either in the front and/or along the back of the spine. This allows the bone to grow together and fuse the spine. Once the motion at a painful motion segment is restricted, the back pain can be reduced. In SGH, 300 patients underwent fusion between September 1998 and June 2004.<sup>21</sup> The four types of fusion surgery performed were: (1) transforaminal lumbar interbody fusion, (2) posterior lumbar interbody fusion, (3) fusion with instrumentation and (4) fusion without instrumentation. The QoL of patients who underwent the surgery was measured by SF-36 and summarized in Figure 12.

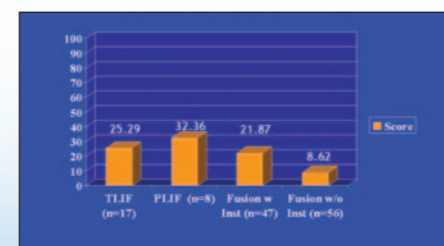


Figure 12. QoL measure after lumbar spinal fusion surgery

### Speakers



**Dr Yeo Sow Nam**  
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Dr Yeo Sow Nam is a Consultant and Director of Pain Management Services, and Director of Acupuncture Services, at SGH. He is also a consultant anaesthetist in the Department of Anaesthesia and Surgical Intensive Care Unit at SGH, a visiting consultant in Pain Management at the National Cancer Centre and honorary consultant at Dover Park Hospice. Dr Yeo is a Fellow of the Australian and New Zealand College of Anaesthetists, a Fellow of the Faculty of Pain Medicine, Australian and New Zealand College of Anaesthetists and Fellow of the Interventional Pain Practice, World Institute of Pain. He is also president of the PAS. He has been a speaker at over 80 international, regional and local meetings in the last two years, and the author of more than 40 abstracts and original articles published in the medical and scientific press.



**Dr Lee Chung Horn**  
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Dr Lee Chung Horn graduated from the National University of Singapore (NUS) in 1984. After becoming a Member of the Royal College of Physicians of the UK, he pursued subspecialty training in endocrinology. In 1994, he went to the Joslin Diabetes Center and Harvard Medical School in Boston, Massachusetts to pursue advanced subspecialty studies in diabetes mellitus. After returning to Singapore in 1995, Dr Lee joined Toa Payoh Hospital-Changi General Hospital where he set up a multi-disciplinary diabetes centre. Dr Lee is Vice-President of the Singapore Association for the Study of Obesity and a founding member of the Singapore Hypertension Society. Currently, Dr Lee is a consultant endocrinologist at Gleneagles Medical Centre. He has served on several high-level Ministry of Health diabetes committees, and helped draft Singapore's latest National Clinical Practice Guidelines for Diabetes Mellitus in 2000. Dr Lee is now heading a team of endocrinologists and other specialists to review and revise these guidelines for Singapore.

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**Prof Feng Pao Hsii**  
MD, FRCP (Edin), FRCP (Glasg), FRACP, FACP, FAMS

Prof Feng Pao Hsii obtained his MBBS from the University of Malaya, Singapore division in 1960. After rotating through the disciplines of surgery, medicine and psychiatry, he was awarded the Colombo Plan Fellowship by the British Government to specialise in Internal Medicine in the UK in 1964. While in the UK, he obtained the MRCP (Glasgow) in 1965. In 1969, he was awarded the World Health Organization Research Fellowship to Israel. On his return, he furthered his research interests in lupus and the rheumatic diseases and subsequently established the only Department of Rheumatology and Immunology in Singapore at the Tan Tock Seng Hospital, and became its first Head in 1981. In 1986, he was awarded the Ministry of Health, HMDP Fellowship to visit centres of excellence in the UK and the US. At present, he holds many positions in the University and the hospitals including Adjunct Professor, Faculty of Medicine, National University of Singapore and Emeritus Consultant with the Department of Rheumatology and Immunology, Tan Tock Seng Hospital. He is also Visiting Consultant to the National University Hospital and SGH.



**Dr Tan Seang Beng**  
MBBS, MMed (Surg), FRCS (Edin), FRCS (Glasg), FABMISS, FAMS

Dr Tan Seang Beng is currently Head and Senior Consultant in Orthopaedic Surgery and Spine Service at SGH and Senior Consultant at K K Women's and Children's Hospital. He graduated with MBBS from NUS in 1981 and obtained his Masters in 1985. Dr Tan is a lecturer both at NUS and Nanyang Technological University and Visiting Consultant at the School Health Services for the Ministry of Health and is Director, Orthopaedic Diagnostic Centre, SGH. He has published many original articles in international and regional peer-reviewed journals and also authored book chapter and Osteoporosis Guidelines. Dr Tan has given more than 130 talks and presentations at international, regional and local meetings.

### Introduction

Pain, a frequently experienced sensation, affects the well-being of an individual in ways that only he or she can express. The International Association for the Study of Pain (IASP) has defined pain as an unpleasant sensory and emotional experience associated with actual or potential tissue damage or described in terms of such damage. In the last few years, the management of pain has evolved immensely with the availability of new therapeutic entities and procedures. Physicians are more equipped than ever to improve the quality of life (QoL) of patients suffering from acute and chronic pain.

### Welcome message

The new Council of the Pain Association of Singapore (PAS) has embarked on a new projects in 2005 to reach out to all our members, supporters and healthcare providers interested in the area of pain management. I am pleased to present the first newsletter of the PAS. In the circulation of these articles, we hope to provide the latest clinical information on many diverse pain conditions. The contents of these newsletters have come from the preceding CME talks, with the first event held at the Singapore General Hospital (SGH) Postgraduate Medical Institute on 7th May 2005. There will be about three such CME programmes. A CD-ROM of all the CME topics will be collated and given to our members and CME attendees at the end of this year. On another note, I am also pleased to announce that the Advisory Board was appointed by the PAS to assist and advise in the various educational projects, seminars and programmes. With the Board's help, we are able to provide a platform where specialists and family physicians can meet and discuss the best options in the management of pain for patients. We welcome questions and answers between readers and our panel of authors. We also welcome suggestions as to how we may improve on this project. For this year, we have outlined various novel projects in the area of pain management, from a large scale island wide survey on the prevalence of pain, to the electronic CME programmes on the society's website.

We hope that pain management in Singapore and even in the region can be raised to a higher level and that no patient may suffer from pain in silence.

**Dr Yeo Sow Nam**  
President, PAS

The Pain Management Advisory Board for the PAS was established in 2004 with a mission to advance the level of pain management in Singapore. The members of the Advisory Board, who come from various clinical disciplines, have dedicated themselves to:

- (1) provide input, based on expertise and experience, in achieving the mission of the Board;
- (2) engage in the exchange of scientific data and information to keep the Board and the PAS at the forefront of pain management and
- (3) contribute expertise to educational projects e.g. CME programmes and seminars conducted by the PAS.

I would like to express my thanks to the members of the Board who, despite their busy schedules, have been able to commit their time and have already made contributions to the discussions and implementation of programmes organized by the PAS.

**Prof Feng Pao Hsii**  
Chairman, Pain Management Advisory Board

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# Breaking barriers of pain management – an update

Dr Yeo Sow Nam

## Epidemiology of pain

Pain is the most common reason for which patients seek medical attention.<sup>1</sup> Each year, acute pain affects 15–20%, while chronic pain affects 25–30% of the US population.<sup>2</sup> Despite its high prevalence, pain is still underdiagnosed and undertreated. As a result, the annual cost of pain is high where medical expenses account for much of the cost. In addition, loss of income and reduced productivity also contribute to the overall economic burden. Large epidemiological studies have long established the prevalence of chronic pain to be close to 20% in developed countries like the US, Europe and Australia.

One of the obstacles may lie with the inexperienced physicians who possess limited knowledge on optimal pain management.

The undertreatment of pain has a tremendous impact on an individual's QoL. Almost 50% of chronic pain sufferers have changed physicians at least once, while 29% of severe pain sufferers have switched three times or more.<sup>3</sup> The main reasons have been: (1) physicians were unwilling to treat pain aggressively, (2) physicians did not take the patient's pain seriously and (3) physicians had inadequate knowledge about pain treatment.<sup>3</sup>

## Common barriers to the treatment of pain

The undertreatment of pain reflects barriers to both assessment and management. These barriers can be broadly categorized as those attributable to the healthcare system, physicians and, patients and families.<sup>3</sup> To help improve pain management, the Joint Commission on Accreditation of Healthcare Organizations (JCAHO) declared pain "the fifth vital sign", a step which requires accredited institutions to recognize, measure and monitor pain as part of standard care (Figure 1).<sup>4</sup>

- Patients' rights
- Assessment of pain
- Care of patients
- Education of patient and family
- Continuum of care
- Improving organization performance

Figure 1. JCAHO's revised standards for pain management

## Pathophysiology and classification of pain

The International Association for the Study of Pain has declared that 'The Relief of Pain should be a Human Right'.

An understanding of the pathophysiology of pain involves the concepts of neuronal plasticity involving the peripheral and central nervous system, and brain. The three distinct forms of neuronal plasticity, term activation, modulation and modification are summarized in Figure 2.<sup>5,6</sup> Sensitization is the manifestation of neuronal plasticity.<sup>5</sup> Sensitization following injury results in hyperalgesia, in which noxious stimuli cause greater and more prolonged pain, as well as allodynia, in which pain results from normally painless stimuli.<sup>7</sup> In addition, pain can be classified as acute or chronic based on its duration, and as nociceptive or neuropathic based on underlying pathophysiology.

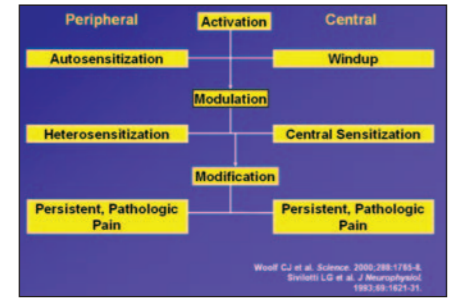


Figure 2. Neuronal plasticity and pain

## Treatment options for acute, chronic and cancer pain sufferers

The management of acute pain focuses on the aggressive prevention and treatment to reduce complications.

There are several options available for the management of chronic pain, including acupuncture with favourable results from randomized controlled trials.<sup>8</sup> The current treatment options available include opioids and non-narcotic analgesics (anticonvulsants, antidepressants and topical agents) as listed in Figure 3.

Interventional therapies involving minimally invasive microinjections of the nerve roots, facet joints, sacroiliac joints and radiofrequency therapy are also very useful, just to name a few.

- COX-2 inhibitors
  - Celecoxib (Celebrex)
  - Valdecoxib (Bextra)/ Parecoxib
  - Etoricoxib (Arcoxia)
- Tramadol SR/ Ultracet/ Tramium
- Gabapentin (Neurontin)/ Pregabalin (Lyrica)
- Matrix systems/ Lollipops/ Inhalational
- Botulinum toxin - (BOTOX & MYOBLOC)
- Hyaluronic (Synvisc)
- Anti-TNF/ Anticytokines

Figure 3. Current treatment options of acute pain

Whilst medications like the COX 2 inhibitors may have significant side effects if taken indiscriminately and for prolonged periods, there is really no evidence at this moment to discredit its use for short term and may really be very useful as adjuncts for pain management. Other medications like tramadol may have a small side effects profile of nausea and vomiting, but may really be useful for the medium and long term.

Many cancer patients spend the last weeks, months or even years of their lives in needless discomfort and disability because of unrelieved pain. Intrathecal neurolysis, which ablates the nerves innervating segments of the tumour, has met with some success in the management of late-stage cancer pain. Other useful and tested modalities include the placement of catheters into the spinal column to deliver drugs so as to achieve optimal pain relief.

The easiest pain to endure is someone else's.

New techniques and technologies are constantly being discovered to help alleviate patients' pain, without necessarily requiring surgery or prolonged use of medications. A multidisciplinary approach involving the pain specialist, various therapists and where indicated, doctors from various specialties, is often the key to the successful management of pain. Early intervention may confer the advantage of preventing chronic pain and its sequelae. All health care professionals really have a stake in the treatments of pain and one must keep abreast of the therapies available so no patients may suffer from pain in silence.

# Pain management in arthritis

Prof Feng Pao Hsiu

## Osteoarthritis: a multifactorial musculoskeletal disorder

The most common form of arthritis is osteoarthritis (OA), which generally affects older individuals. It is characterized by changes in the articular cartilage and adjacent subchondral bone with symptoms like pain, stiffness, limitation of movement and, occasionally, swelling. Although the course of OA is variable, there is usually progression to joint damage and deformities (Figure 4).<sup>9</sup> As a multifactorial disease, the risk factors of osteoarthritis include age, gender, obesity, genes, injury to the joint and repetitive stressful joint use.



Figure 4. Pathology of osteoarthritis

## Prevalence and disease burden of osteoarthritis

In Singapore, osteoarthritis of the knee is very common among the elderly aged 65 years and above. Approximately 10–15% of these patients are disabled and the numbers are expected to rise rapidly with the aging population.<sup>10</sup> In the US, osteoarthritis affects 15% of the population and by the year 2020, an estimated 18.2% will be affected.<sup>11</sup> As the world's population ages, osteoarthritis will become an increasing global healthcare burden. The

economic impact of osteoarthritis on the society is also significant with the costs of illness accounting for up to 1–2.5% of the gross national product for many countries including the US.<sup>12</sup>

## Management of osteoarthritis

Traditional treatment of osteoarthritis consists mainly of nonsteroidal anti-inflammatory drugs (NSAIDs) and analgesics. NSAIDs are involved in the prevention of the formation of prostaglandins by inhibiting cyclooxygenase (COX); COX-1 and COX-2. The mechanism of action of COX-1 and COX-2 is summarized in Figure 5.<sup>13</sup> Some of the barriers to the management of chronic pain in older patients with arthritis are summarized in Figure 6.

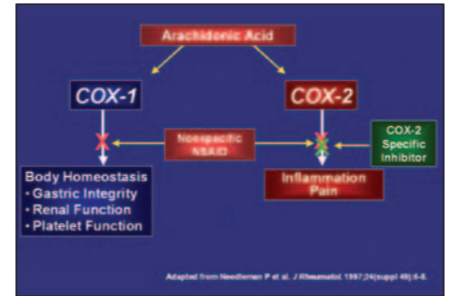


Figure 5. Mechanism of action of selective and nonselective NSAIDs

- 70 % of elderly patients with arthritis suffer from some degree of pain
- Personal choice – many have co-morbid conditions and take many other drugs
  - Age – related expectations – pain comes with age
  - Diversional activities – shopping, going to church, gardening, needlework, looking after grandchildren, music
  - Relationship with health-care worker – poor communication
  - Knowledge deficit
  - Emotional distress
  - Use of adaptive resources eg cushions, canes, walker

Figure 6. Barriers to pain management in arthritis patients

The relatively modest COX-2 selectivity of celecoxib provides additional benefit to patients who depend on NSAIDs for relief of inflammation and pain.

## Cyclooxygenase-2 inhibitors – coxibs

Celecoxib, a selective inhibitor of COX-2, has an approximate 375-fold greater affinity for COX-2 than COX-1.<sup>14</sup> Studies in patients with osteoarthritis indicate that celecoxib has equivalent efficacy to NSAIDs but with fewer adverse events.<sup>15</sup> However, all trial evidence argue against prolonged use of available coxibs for more than 18 months at a high dose. The risk ratio for cardiovascular events is between 2.5–3.5 compared to placebo.<sup>16</sup> Hence patients with cardiovascular risk factors are especially vulnerable and should take coxibs with great care. In summary, it is recommended that physicians should aim at using the lowest effective dose if no alternative therapy can be found.

The world needs coxibs.....many people cannot function without them.

# Diabetic neuropathic pain

Dr Lee Chung Horn

## Peripheral neuropathy

Neuropathic pain is defined by the IASP as pain initiated or caused by a primary lesion or dysfunction in the nervous system.

The three broad types of neuropathy are sensory (or peripheral), autonomic and motor which are summarized in Figure 7. Diabetic neuropathies are a family of nerve disorders caused by diabetes, the most common being sensory neuropathy. One of the more distressing and difficult to manage symptoms of diabetic neuropathy is pain, which can occur, in both focal neuropathy and symmetric polyneuropathy. Patients with diabetes experience spontaneous- and stimulus-evoked pain.

Sensory neuropathy (or peripheral neuropathy) affects the nerves that carry information to the brain about sensations from various parts of the body - how hot or cold something is, what the texture of something feels like, the pain caused by a sharp object or heat, etc. This is the most common form of diabetic neuropathy. Sensory neuropathy can lead to pain, numbness or tingling in the extremities and, ultimately, an inability to feel heat, cold, pain or any other sensation in affected areas.

Figure 7. Peripheral neuropathy

## The pathophysiology of diabetic neuropathy

The first sign of the disease is usually numbness, pain, or tingling in the hands, feet, or legs.

Basically, the pathophysiology of pain can be divided into nociceptive, neuropathic, or idiopathic processes. However, the intricate pain processes involve the interplay of a number of underlying mechanisms. Hyperalgesia is frequently present by history and on examination. The pathophysiologic basis for diabetic neuropathy pain has not been established. Morphological abnormalities that have been associated with neuropathic pain include axonal sprouting, acute axonal degeneration, active degeneration of myelinated fibres, and disproportionate loss of large calibre nerve fibers.<sup>17,18</sup>

With gabapentin, patients suffering from diabetic neuropathy showed a 40.6% absolute decrease in mean pain score.

## Treatment of painful diabetic neuropathy

Treatment of diabetic neuropathic pain requires attempts at strict control of blood glucose levels as there is evidence that hyperglycaemia may adjust the pain threshold. Since the pain of diabetic neuropathy is characteristically worse at night, regular dosing of an analgesic in the early evening and again before sleep may reduce analgesic requirements at night and improve sleep. Pharmacotherapy for the management of neuropathic pain involves the use of mainly tricyclic antidepressants and anticonvulsants, but which drug class should be first-line choice remains unclear.

## Anticonvulsants

Gabapentin is the most extensively studied anticonvulsant used in pain management.<sup>19</sup>

Anticonvulsants from several classes have been used to treat painful diabetic neuropathy. Gabapentin is currently the most frequently prescribed anticonvulsant for the treatment of neuropathic pain. In several trials, this agent has demonstrated effectiveness in the treatment of painful diabetic neuropathy. Given its favourable side-effect profile, this agent is often first choice for the treatment of painful diabetic peripheral neuropathy.<sup>19,20</sup>

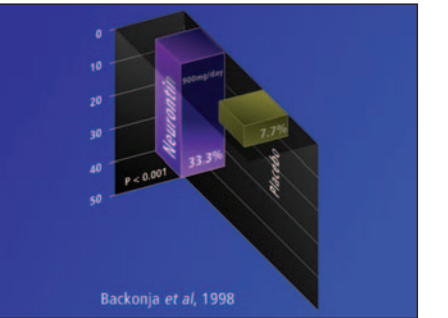


Figure 8. Gabapentin significantly decreases mean pain scores compared with placebo

In an 8-week randomized double-blind placebo controlled study in 165 patients with painful diabetic peripheral neuropathy, monotherapy with gabapentin produced a statistically significant decrease in mean pain scores compared with placebo. The mean pain scores decreased from a baseline value of 6.4 to 3.9 at the end of 8 weeks in the gabapentin group while the placebo-treated patients experienced a decrease from 6.5 at baseline to 5.1 by 8 weeks.

The efficacy of gabapentin and amitriptyline was compared in a 8-week randomized double-blind study in 28 patients with painful diabetic peripheral neuropathy. There was no difference in pain scores with the two agents.

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Figure 9. Pharmacokinetic properties of gabapentin