29 September – 01 October 2011

Colombo, Sri Lanka
Contents

Messages

Minister of Health, Sri Lanka
Co-Chair, Asia Pacific Stroke Conference 2011
President, Asia Pacific Stroke Organization
President, World Stroke Organization

APSO Executive Council

APSC Organizing Committee

Scientific programme and details regarding workshops

Faculty

Abstracts of plenary lectures and symposia 23
Abstracts of oral presentations 42
Abstracts of poster presentations 49

Index 80

Sponsors 82
Message from the Hon. Minister of Health

I am happy to send this message on the occasion of the ‘Asia Pacific Stroke Conference 2011’ which is being held in Sri Lanka.

Stroke is a major cause of death and biggest single cause of disability worldwide. Heart disease, stroke, cancer, diabetes and other chronic NCDs are often thought to be public health problems of significance only in high-income countries. In reality 80% of world stroke occurs in the developing countries. This undermines countries’ economic development as many of those affected are at the peak of their productive and economic activity.

Over the last decade the Government of Sri Lanka has taken important steps to handle the cardiovascular deaths by allocating extra funds for prevention of NCDs, establishing a separate unit and appointing a Director for NCD, appointing designated Medical Officers for NCD, establishing healthy life style clinics and prioritizing establishment of stroke units in all major hospitals. These steps should intervene across the community to reduce prevalence of high blood pressure, high cholesterol, smoking, diabetes mellitus, etc. which are the risk factors for stroke.

On this regard, Asia Pacific Stroke Conference is an invaluable academic event for the medical profession interested in prevention and control of cardiovascular disease in this region. And to scale up actions, particularly primary prevention interventions and other cost effective interventions in NCD Management.

These actions need to start immediately. I wish the conference success.

Maithripala Sirisena
Minister of Health
Sri Lanka
Message from the Co-Chair, APSC 2011

It is a great pleasure to send this message to the Asia Pacific Stroke Conference 2011 souvenir. It is the first ever international stroke conference organized in Sri Lanka. Being the president of the National Stroke Association of Sri Lanka and the co chair of the organizing committee of the APSC, I am personally delighted to organize this international conference with a most vibrant academic programme that in turn will serve to uplift stroke care in the region.

Stroke is the leading cause of adult disability and the second cause of deaths among people over 50 years of age. There are numerous misconceptions with regard to stroke especially in low-middle income countries. The Asia Pacific Stroke Conference on the theme “Stroke in Asia: Time for dignity and justice” will be invaluable not only to disseminate knowledge but also to improve attitudes of all stakeholders of stroke care in the region.

As one would appreciate, organizing a conference of this magnitude is the final outcome of a collective effort of all those involved in organizing the conference. The Asia Pacific Stroke Organization, World Stroke Organization, World Stroke Academy and the National Stroke Association of Sri Lanka played a vital role in raising the standard of the APSC 2011 to the highest possible level. It is the tireless efforts of the local organizing committee that made this conference a reality.

I am most grateful to the exhibitors for their invaluable contributions. I warmly welcome all resource persons, chair persons, delegates and exhibitors to APSC 2011 and also to Colombo, Sri Lanka.

Let us wish together for a most fruitful APSC 2011!

Padma S Gunaratne
Co-chair, APSC 2011
President, National Stroke Association of Sri Lanka
Message from President, Asia Pacific Stroke Organization

The merger of the Asia Pacific Stroke Association and the Asian Stroke Federation in 2009 formed the Asia Pacific Stroke Organization (APSO). I feel proud and most privileged to release this message as the founder President of the Asia Pacific Stroke Organization.

APSC 2011 is held in a context where 80% of global stroke occurs in Low Middle income countries, and the measures for prevention and treatment for stroke in those countries are suboptimal. Therefore, one of the main objectives of the APSO would be to share the knowledge and practices amongst countries for the benefit of stroke victims and the prevention of stroke at large.

I am thankful to the Scientific Programme Committee for putting forward a vibrant academic programme with a wide coverage of stroke related issues that would be the main concern of majority of the delegates in this conference. The location, Sri Lanka, is the most attractive venue that would make a difference of this conference to any others held in this region previously.

I warmly welcome all resource persons and delegates to the Asia Pacific Stroke Conference and eagerly look forward to explore this beautiful island with its rich heritage and culture.

Yukito Shinohara
Co-chair, APSC Organizing Committee
President, Asia Pacific Stroke Organization
Message from President, World Stroke Organization

It is my distinct pleasure to take part in this congress in my role as President of the World Stroke Organization. Data on the magnitude of stroke deaths, attack rates, prevalence rates and burden of disabilities after stroke are so frequently cited that they may risk to blunt our minds – but the facts remain: stroke is a major disease in any part of the world and the situation is likely to worsen unless counteractions are taken. The situation is particularly grave in the Asia Pacific region in which more than half of all strokes in the world occur.

I welcome the formation of the Asia Pacific Stroke Society which will play an important function for the stroke field in this part of the world. APSO has a strong leadership role now and in the future. I am very pleased with the excellent collaboration between the APSO and the WSO, and I am impressed by the strength and energy of the APSO.

The Asia Pacific Stroke Conference will feature a wealth of new important information and inspiration to the attendees, and I urge you all to bring home the best ideas to your own local environment and your own region so that substantial and durable changes are made. I would like to give special thanks to the organizers of this conference – your hard work is now harvested by us.

I wish you all a successful conference in the best of spirits in the beautiful scenery of Sri Lanka.

Bo Norrving
President,
World Stroke Organization
EXECUTIVE COUNCIL OF ASIA
PACIFIC STROKE ORGANIZATION

President
Yukito Shinohara (Japan)

President Elect
Niphon Poungvarin (Thailand)

General Secretary
Craig Anderson (Australia)

Treasurer
Chen Ya Huang (Hong Kong)

Chairman Scientific Committee
M M Mehdiratta (India)
APSC ORGANIZING COMMITTEE

Co-Chairpersons
Padma Gunaratne (Sri Lanka)
Yukito Shinohara (Japan)

Patron
J B Peiris

Scientific Programme Committee
M M Mehndiratta (Chair) (India)
Craig Anderson (Australia)
Udaya Ranawaka (Sri Lanka)
N V Ramani (Singapore)
Tissa Wijayaratne (Australia)

Local Organizing Committee
Ranjanie Gamage (Sri Lanka)
M T M Riffsy (Sri Lanka)
Sepalika Mendis (Sri Lanka)
Sunethra Senanayake (Sri Lanka)
Lalith Wijayaratne (Sri Lanka)
Anil Dissanayaka (Sri Lanka)
Lanka Dissanayake (Sri Lanka)
Palitha Karunapema (Sri Lanka)

Joint Secretaries
Arjuna Fernando (Sri Lanka)
Harsha Gunasekara (Sri Lanka)

Treasurers
Sunethra Senanayake (Sri Lanka)
Lalith Wijayaratne (Sri Lanka)

Co-Editors
Senaka Bandusena (Sri Lanka)
Saman Gunatilake (Sri Lanka)

Country Representatives
N V Ramani (Singapore)
Lu Chuanzhen (China)
Byung Woo Yoon (Korea)
Mohammad Wasay (Pakistan)
Muzharul Mannan (Bangladesh)
Tan Kay Sin (Malaysia)
Jose Navarro (Philippines)
Yohanna Kusuma (Indonesia)

International Advisory Committee
Hamidon Basri (Malaysia)
Alan Barber (New Zealand)
Christopher Chen (Singapore)
Lu Chuanzhen (China)
C Y Huang (Hong Kong)
Muzharul Mannan (Bangladesh)
Jose C Navarro (Philippines)
Thang Nguyen (Vietnam)
Jeyaraj Pandian (India)
Niphon Poungvarin (Thailand)
Mohammad Wasay (Pakistan)
Byung-Woo Yoon (S. Korea)
APSC ORGANIZING COMMITTEE

Seated – From Left to right
Dr Harsha Gunasekara, Dr Sunethra Senanayake, Dr Padma Gunaratne, Dr J B Peiris, Professor Saman Gunatilake, Dr Arjuna Fernando

Standing – From Left to right
Mr Upali De Silva, Dr MTM Riffsy, Dr Sepalika Mendis, Professor Ranjanie Gamage, Dr Lalith Wijayaratne, Dr Senaka Bandusena

Absentees
Dr Udaya Ranawaka, Dr Anil Dissanayaka, Dr Palitha Karunapema, Dr Thalatha Liyanage, Dr Lanka Dissanayake
## Programme of the Asia Pacific Stroke Conference

### DAY 1 – Thursday, 29 September 2011

**Venue:** Cinnamon Grand Hotel

### PRECONGRESS PARALLEL WORKSHOPS

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>02:30pm</td>
<td>APSO Executive committee meeting (Venue: Ivy room)</td>
</tr>
<tr>
<td>04:30pm</td>
<td>Media meeting (Venue: Ivy room)</td>
</tr>
<tr>
<td>07:00pm</td>
<td>Inauguration ceremony</td>
</tr>
<tr>
<td>08:00pm</td>
<td>Welcome reception</td>
</tr>
<tr>
<td>10:30pm</td>
<td>END</td>
</tr>
</tbody>
</table>

### Teaching course

**Chair:** Senaka Bandusena & Palitha Karunapema

<table>
<thead>
<tr>
<th>Time</th>
<th>Topic</th>
<th>Presenter</th>
</tr>
</thead>
<tbody>
<tr>
<td>09:00am</td>
<td>Acute stroke-Management related issues</td>
<td>Niphon Poungvarin, Thailand</td>
</tr>
<tr>
<td>09:30am</td>
<td>Establishing stroke services from grass root level</td>
<td>Jeyaraj Pandian, India</td>
</tr>
<tr>
<td>10:00am</td>
<td>Blood pressure control in acute stroke</td>
<td>Craig Anderson, Australia</td>
</tr>
<tr>
<td>10:30am</td>
<td>TEA</td>
<td></td>
</tr>
</tbody>
</table>

**Chair:** Anil Dissanayaka & V T Rajendran

<table>
<thead>
<tr>
<th>Time</th>
<th>Topic</th>
<th>Presenter</th>
</tr>
</thead>
<tbody>
<tr>
<td>11:00am</td>
<td>Stroke in young</td>
<td>Saman Gunatilake, Sri Lanka</td>
</tr>
<tr>
<td>11:30am</td>
<td>Models of care for management of TIA</td>
<td>Tissa Wijeratne, Australia</td>
</tr>
<tr>
<td>12:00noon</td>
<td>Vascular dementia</td>
<td>Christopher Chen, Singapore</td>
</tr>
<tr>
<td>12:30pm</td>
<td>LUNCH</td>
<td></td>
</tr>
</tbody>
</table>

**Chair:** Nilupul Perera & Janaka Peiris

<table>
<thead>
<tr>
<th>Time</th>
<th>Topic</th>
<th>Presenter</th>
</tr>
</thead>
<tbody>
<tr>
<td>01:30pm</td>
<td>Organization of stroke services</td>
<td>N V Ramani, Singapore</td>
</tr>
<tr>
<td>02:00pm</td>
<td>Which antiplatelet for primary and secondary prevention of stroke?</td>
<td>M M Mehdiratta, India</td>
</tr>
<tr>
<td>02:30pm</td>
<td>How do you write a high quality scientific paper?</td>
<td>Valery Feigin, New Zealand</td>
</tr>
<tr>
<td>03:00pm</td>
<td>TEA</td>
<td></td>
</tr>
</tbody>
</table>

**Chair:** A T Alibhoy & Thashi Chang

<table>
<thead>
<tr>
<th>Time</th>
<th>Topic</th>
<th>Presenter</th>
</tr>
</thead>
<tbody>
<tr>
<td>03:30pm</td>
<td>Cerebral venous thrombosis</td>
<td>Mohammad Wasay, Pakistan</td>
</tr>
<tr>
<td>04:00pm</td>
<td>END</td>
<td></td>
</tr>
</tbody>
</table>
## Stroke rehabilitation
*(sponsored by World Health Organization)*

**Chair:** M T M Riffsy & Lalith Wijayaratne

<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
<th>Speaker</th>
</tr>
</thead>
<tbody>
<tr>
<td>09:00am</td>
<td>Welcome and introduction</td>
<td>Charitha Perera, Australia</td>
</tr>
<tr>
<td>09:05am</td>
<td>Models of stroke rehabilitation – From hospital to community</td>
<td>Michael Pollack, Australia</td>
</tr>
<tr>
<td>09:50am</td>
<td>Who should have rehabilitation? How to identify responders to rehabilitation</td>
<td>Lynley Bradnam, Australia</td>
</tr>
<tr>
<td>10:40am</td>
<td>TEA</td>
<td></td>
</tr>
<tr>
<td>11:00am</td>
<td>Improving strength and dexterity after a stroke – what is the evidence?</td>
<td>Natasha Lannin, Australia</td>
</tr>
<tr>
<td>11:40am</td>
<td>Management of spasticity and contracture</td>
<td>Natasha Lannin, Australia</td>
</tr>
<tr>
<td>12:00noon</td>
<td>LUNCH</td>
<td></td>
</tr>
<tr>
<td>01:00pm</td>
<td>Workshops on;</td>
<td></td>
</tr>
<tr>
<td>1.</td>
<td>Practical aspects of working in a rehabilitation team: goal setting, when to stop, carer training</td>
<td>Michael Pollack, Australia Charitha Perera, Australia</td>
</tr>
<tr>
<td>2.</td>
<td>Injections of botulinum toxin for spasticity management</td>
<td>Roy Lee, Singapore Venugopal Kochiyil, India</td>
</tr>
<tr>
<td>3.</td>
<td>Electrical stimulation therapy</td>
<td>Natasha Lannin, Australia</td>
</tr>
<tr>
<td>03:00pm</td>
<td>TEA</td>
<td></td>
</tr>
<tr>
<td>03:15pm</td>
<td>Panel discussion and question time</td>
<td>All</td>
</tr>
<tr>
<td>04:00pm</td>
<td>END</td>
<td></td>
</tr>
</tbody>
</table>

### Cerebro-vascular ultrasound /TCD

**Chair:** Maher Saqqur & Sunethra Senanayaka

<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
<th>Speaker</th>
</tr>
</thead>
<tbody>
<tr>
<td>09:00am</td>
<td>Introduction</td>
<td></td>
</tr>
<tr>
<td>09:05am</td>
<td>Cervical duplex sonography – technique and application in stroke</td>
<td>Lokesh B, India</td>
</tr>
<tr>
<td>09:30am</td>
<td>Diagnostic trans cranial doppler/ intracranial atherosclerosis</td>
<td>Maher Saqqur, Canada</td>
</tr>
<tr>
<td>09:55am</td>
<td>Advanced applications of TCD I (right to left shunt, VMR)</td>
<td>Vijay Sharma, Singapore</td>
</tr>
<tr>
<td>10:20am</td>
<td>Questions</td>
<td></td>
</tr>
<tr>
<td>10:30am</td>
<td>TEA</td>
<td></td>
</tr>
<tr>
<td>10:50am</td>
<td>Advanced applications of TCD II (emboli monitoring, vasospasm, sickle cell anaemia and brain death)</td>
<td>Maher Saqqur, Canada</td>
</tr>
<tr>
<td>11:15am</td>
<td>Sonothrombolysis</td>
<td>Vijay Sharma, Singapore</td>
</tr>
<tr>
<td>11:40am</td>
<td>Interesting cases</td>
<td>Dheeraj Khurana/ Lokesh B, India</td>
</tr>
<tr>
<td>12:05pm</td>
<td>Discussion</td>
<td></td>
</tr>
<tr>
<td>12:20pm</td>
<td>LUNCH</td>
<td></td>
</tr>
<tr>
<td>01:00pm</td>
<td>Hands-on and practical demonstrations with carotid and trans cranial doppler</td>
<td>Dheeraj Khurana/ Lokesh B/Vijay Sharma/ Maher Saqqur</td>
</tr>
<tr>
<td>04:00pm</td>
<td>END</td>
<td></td>
</tr>
</tbody>
</table>
## DAY 2 – Friday, 30 September 2011

<table>
<thead>
<tr>
<th>09:00am</th>
<th><strong>Plenary</strong></th>
<th><strong>Chair:</strong> Yukito Shinohara &amp; Padma Gunaratne</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Stroke burden in the Asia Pacific region from 1990-2010: updates from the Global Burden of Disease Project</td>
<td>Valery Feigin, New Zealand</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>09:30am</th>
<th><strong>Symposium</strong></th>
<th><strong>Chair:</strong> Niphon Poungvarin &amp; Saman Gunatilake</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Acute management of stroke</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Stroke syndromes</td>
<td>MM Mehndiratta, India</td>
</tr>
<tr>
<td></td>
<td>Thrombolysis for ischaemic stroke in Japan</td>
<td>Yukito Shinohara, Japan</td>
</tr>
<tr>
<td></td>
<td>Imaging and neurovascular intervention in stroke – a practical view</td>
<td>Paul Butler, United Kingdom</td>
</tr>
<tr>
<td></td>
<td>Management of malignant MCA</td>
<td>NV Ramani, Singapore</td>
</tr>
</tbody>
</table>

| 11:00am | TEA |

<table>
<thead>
<tr>
<th>11:30am</th>
<th><strong>Symposia</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><strong>Hall A</strong></td>
</tr>
<tr>
<td></td>
<td>Getting the evidence and understanding the evidence</td>
</tr>
<tr>
<td></td>
<td>Systematic reviews of clinical trials of treatments for stroke</td>
</tr>
<tr>
<td></td>
<td>Peter Sandercock, UK</td>
</tr>
<tr>
<td></td>
<td>Conducting stroke research: opportunities for collaboration between developed and developing world</td>
</tr>
<tr>
<td></td>
<td>Craig Anderson, Australia</td>
</tr>
<tr>
<td></td>
<td>New clinical evidences on thrombolysis and neuroprotective agents</td>
</tr>
<tr>
<td></td>
<td>Kazuo Minematsu, Japan</td>
</tr>
<tr>
<td></td>
<td>Clinical trials in Sri Lanka</td>
</tr>
<tr>
<td></td>
<td>Asita De Silva, Sri Lanka</td>
</tr>
<tr>
<td></td>
<td><strong>Hall B</strong></td>
</tr>
<tr>
<td></td>
<td>Challenges of post stroke care</td>
</tr>
<tr>
<td></td>
<td>Neuro-critical care of stroke</td>
</tr>
<tr>
<td></td>
<td>Johnny Lokin, Philippines</td>
</tr>
<tr>
<td></td>
<td>Management of complications</td>
</tr>
<tr>
<td></td>
<td>P N Sylaja, India</td>
</tr>
<tr>
<td></td>
<td>Post-stroke spasticity and disability</td>
</tr>
<tr>
<td></td>
<td>Michael Branin, Austria</td>
</tr>
<tr>
<td></td>
<td>Neuro plasticity and stroke recovery</td>
</tr>
<tr>
<td></td>
<td>Alan Barber, New Zealand</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>12:45pm</th>
<th><strong>LUNCH TIME SYMPOSIUM</strong></th>
<th><strong>Chair:</strong> Yukito Shinohara &amp; Padma Gunaratne</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Asian stroke: Does it differ from western stroke?</td>
<td>(Sponsor: Otsuka Pharmaceutical Co.)</td>
</tr>
<tr>
<td></td>
<td>What are the stroke etiologies particularly seen in Asians?</td>
<td>Jeyaraj Pandian, India</td>
</tr>
<tr>
<td></td>
<td>Intracranial atherosclerosis and branch atheromatous disease: a prevalent problem in Asians</td>
<td>Jong S Kim, South Korea</td>
</tr>
<tr>
<td></td>
<td>Risk-benefit profile of anti-platelet therapy in Japanese stroke patients</td>
<td>S Uchiyama, Japan</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>02:15pm</th>
<th><strong>Symposium</strong></th>
<th><strong>Chair:</strong> Richard Lindley &amp; Chandrika Wijeratne</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Public health issues related to NCD</td>
<td>(Sponsor: World Health Organization)</td>
</tr>
<tr>
<td></td>
<td>Post UN High level meeting: What next for NCDs?</td>
<td>Shanthi Mendis, Sri Lanka</td>
</tr>
<tr>
<td></td>
<td>Public Health issues related to NCD: Regional perspective</td>
<td>Firdosi Rustom Mehta, WHO</td>
</tr>
<tr>
<td></td>
<td>Public Health issues related to NCD: Sri Lankan perspective</td>
<td>Rohini Seneviratne, Sri Lanka</td>
</tr>
</tbody>
</table>

| 03:30pm | TEA |

<table>
<thead>
<tr>
<th>03:45pm</th>
<th><strong>Symposium</strong></th>
<th><strong>Chair:</strong> N V Ramani &amp; Arjuna Fernando</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Improving stroke services</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Setting up acute stroke services and making them work</td>
<td>Michael Brainin, Austria</td>
</tr>
<tr>
<td></td>
<td>Strengthening care and support after stroke in the long term</td>
<td>Bo Norrving, Sweden</td>
</tr>
<tr>
<td></td>
<td>Establishing stroke services in resource limited setting</td>
<td>Tissa Wijeratne, Australia</td>
</tr>
</tbody>
</table>

| 05:00pm | **APSO General assembly** |

| 06:30pm | END |

| 07:30pm | **APSO DINNER** |
### DAY 3 – Saturday, 1 October 2011

#### Free papers

<table>
<thead>
<tr>
<th>Hall A</th>
<th>Hall B</th>
<th>Hall C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chair: Hamidon Basri &amp; K D Pathirana</td>
<td>Chair: Johnny Lokin &amp; Dharshana Wijegunasingha</td>
<td>Chair: Muzharul Mannan &amp; Bimsara Senanayaka</td>
</tr>
<tr>
<td>Pathophysiology and symptomatology of stroke</td>
<td>Management of acute stroke and stroke rehabilitation</td>
<td>Epidemiology and prevention of stroke</td>
</tr>
</tbody>
</table>

#### 09:00am Plenary

**Chair:** Mohammad Wasay & Sunethra Senanayaka

**Risk and outcome of Intracerebral Haemorrhage**

*Byung-Woo Yoon, South Korea*

#### 09:30am Symposium

**Chair:** Shinichiro Uchiyama & Sepalika Mendis

**Prevention of stroke – An evidence based approach**

| Management of cardio-vascular risk factors | Ruwan Ekanayake, Sri Lanka |
| Atrial fribillation and stroke | Stephen Davis, Australia |
| Management of carotid stenosis: surgery or stenting – Asian perspective | Lawrence Wong, Hong Kong |

#### 10:45am TEA

#### 11:15am Special symposium of the World Stroke Organisation

**Chair:** Michael Brainin & Stephen Davis

**Cardinal principles of stroke management**

| The educational mission of the WSO | Bo Norrving, Sweden |
| The numbers and needs of stroke education in Asia | Lawrence Wong, Hong Kong |
| Early recognition and diagnosis of stroke | Stephen Davis, Australia |
| Medical treatment of stroke | Peter Sandercock, UK |
| Prevention of complications in acute stroke | Michael Brainin, Austria |
| Early mobilization of stroke patients | Bo Norrving, Sweden |

#### 01:00pm LUNCH TIME DEBATE

**Chair:** Athula Dissanayake & Tissa Wijeratne

The ABCD2 score is a useful tool, applicable worldwide, to the clinical management of suspected TIA

**Speakers:** Peter Sandercock vs Alan Barber

#### 02:15pm Symposium

**Chair:** M M Mehndiratta & Amanda Thrift

**Care for stroke in the Asia Pacific region**

| Vietnam | Huy Thang Nguyen, Vietnam |
| Sri Lanka | Udaya Ranawaka, Sri Lanka |
| Malaysia | Hamidon Basri, Malaysia |
| Indonesia | Jusuf Misbach, Indonesia |
| China | Ming Liu, China |

Awards for best poster and best platform presentations

#### 03:30pm TEA

#### 03:45pm Stroke case studies

**Chair:** Valery Feigin & Udaya Ranawaka

*Panel: N V Ramani (Singapore), Mohamed Wasay (Pakistan), Michael Pollack (Australia)*

**Case presentations by:** Shinichiro Uchiyama, Japan

Tissa Wijeratne, Australia

Padma Gunaratne, Sri Lanka

#### 04:45pm END
Free Papers – Oral Presentations
Parallel Session Halls A, B, C

1st October 2011 – 8.00 am to 9.00 am

Hall A – Pathophysiology and symptomatology of stroke

OP-1 – The association between serum adiponectin and carotid intima media thickness in community based cohort in Korea
J. Park, M. Ahn, S. Koh, S. V. Ahn
Yonsei University Wonju College of Medicine, South Korea

OP-2 – Early conscious disturbance in acute ischemic stroke: Incidence, risk factors and outcome
J. Li, W. Tao, W. Dong, J. Zhang, D. Wang
The Stroke Clinical Research Unit, Department of Neurology, West China Hospital, Sichuan University, Chengdu, PR China

OP-3 – Post stroke depression: prevalence and determinants in Sri Lankan stroke patients
Unit 2, Institute of Neurology, National Hospital of Sri Lanka, Sri Lanka

OP-4 – Fasting serum glucose and risk of stroke in men and women: an 11-year longitudinal study
S. V. Ahn, H. C. Kim, I. Suh
Yonsei University Wonju College of Medicine, South Korea

OP-5 – A large-scale, Australian genetic study of ischaemic stroke and its heritable subtypes
Centre for Clinical Epidemiology and Biostatistics, University of Newcastle, New South Wales, Australia

Hall B – Management of acute stroke and stroke rehabilitation

OP-6 – Safety and efficacy of EKOS system and Solitaire stent device in major cerebral artery occlusion: A randomized pilot study
D. Skoloudik, M. Kuliha, M. Roubec, D. Sanak, R. Herzig
University Hospital Ostrava, Czech Republic

OP-7 – Selecting and excluding stroke patients from thrombolysis in a General Hospital using Emergency Department (ED) physicians and telemedicine support
D. Collas, R. Henniker-Major, R. Wathes
West Hertfordshire Hospitals NHS Trust, United Kingdom
OP-8 - Persistence of hyperdense middle cerebral artery sign on follow-up CT scan after intravenous thrombolysis is associated with poor outcome
P. K. Loh, K. W. P. Ng, P. R. Paliwal, S. Liang, V. K. Sharma
National University Hospital, Singapore

OP-9 - Usefulness of CT angiography for therapeutic decision making in thrombolyzing difficult to assess patients with basilar artery thrombosis
K. W. P. Ng, P. K. Loh, N. Venkatasubramanian, B. P. L. Chan, V. K. Sharma
National University Hospital, Singapore

OP-10 - Trends in characteristics, aetiology and outcome of ischaemic stroke in a Chinese hospital-based stroke study
B. Wu, S. Lin, W. Tao, Z. Hao, D. Wang
Stroke Clinical Research Unit, Department of Neurology, West China Hospital, Sichuan University, China

Hall C – Epidemiology and prevention of stroke

OP-11 - Recurrent strokes in Sri Lankan patients: data from the Ragama Stroke Registry
Faculty of Medicine, University of Kelaniya, Sri Lanka

OP-12 - Functional, cognitive and psychological outcomes and recurrent vascular events in Pakistani stroke survivors
M. Khan, B. Ahmed, M. Ahmed, M. Najeeb, A. Kamal
The Aga Khan University Hospital, Pakistan

OP-13 - Natural history of intracerebral haemorrhage (ICH) in Western China: A multi-center, hospital registry study
W. Dong, J. Li, Q. Li, H. Zhou, X. Jiang
Department of Neurology, West China Hospital, Sichuan University, Chengdu, China

OP-14 - Epidemiology of stroke in the district of Colombo, Sri Lanka: a community-based study
T. Chang, S. Gajasinghe, C. Arambepola
Department of Clinical Medicine, University of Colombo, Sri Lanka

OP-15 - Prevalence of patent foramen ovale in young onset cryptogenic stroke in Sri Lanka
S. C. Somarathna, S. A. C. U. Gunawardhana, A. Arasalingam, P. S. Gunaratne
Unit 2, Institute of Neurology, National Hospital of Sri Lanka, Sri Lanka
Professor Craig Anderson, Australia
Director of the Neurological and Mental Health Division, The George Institute
Professor of Stroke Medicine and Clinical Neurosciences, Faculty of Medicine, University of Sydney and Institute of Neurosciences, Royal Prince Alfred Hospital

Professor Peter Alan Barber, New Zealand
Professor of Clinical Neurology, University of Auckland
Deputy Director, Centre for Brain Research, University of Auckland

Professor Hamidon Basri, Malaysia
Deputy Dean (Academic) and Head of the Neurology Unit, Faculty of Medicine and Health Sciences UPM
President, Malaysian Society of Neurosciences (MSN) and Malaysian Stroke Council

Dr Lokesh Bathala, India
Associate Professor, Department of Neurology, Division of Stroke and Neurosonology, Narayana Medical College and Hospital, Andhra Pradesh

Dr Lynley Bradnam, Australia
Senior Lecturer in Physiotherapy, Flinders University, Adelaide

Professor Michael Branin, Austria
Professor of Clinical Neurology, Danube-University Krems
Chairman of the WSO Education Committee
Dr Paul Butler, United Kingdom  
Consultant Neuroradiologist, Barts and the London NHS Trust, London

Dr Christopher Chen, Singapore  
Senior Clinician-Scientist, National Medical Research Council of Singapore  
Associate Professor, Department of Pharmacology, Faculty of Medicine, National University of Singapore  
Director, Memory Aging and Cognition Centre, National University Healthcare System and Co-PI, NUHS Ischemic Stroke Research Programme

Professor Stephen Davis, Australia  
Professor of Translational Neuroscience, University of Melbourne  
Director of Neurology and Director Melbourne Brain Centre, Royal Melbourne Hospital

Professor Asita De Silva, Sri Lanka  
Professor in Clinical Pharmacology, Faculty of Medicine, University of Kelaniya  
Director, Clinical Trials Unit, University of Kelaniya

Dr Ruwan Ekanayake, Sri Lanka  
Senior Consultant Cardiologist, Institute of Cardiology, National Hospital of Sri Lanka, Colombo

Professor Valery Feigin, New Zealand  
Professor of Neurology and Epidemiology, AUT University  
Professor and Director of the National Institute for Stroke and Applied Neurosciences, Faculty of Health and Environmental Sciences, AUT University of Auckland
**Professor Saman Gunatilake, Sri Lanka**  
Consultant Neurologist, Professor of Medicine, University of Sri Jayawardenepura & Colombo South Teaching Hospital, Sri Lanka

**Dr Dheeraj Khurana, India**  
Additional Professor of Neurology, PGIMER, Chandigarh

**Dr Jong S Kim, South Korea**  
Professor of Neurology, Medical College, University of Ulsan  
Director, Stroke Center, Asan Medical Center

**Dr Venugopal Kochiyil, India**  
Clinical Director, Livewell Institute of Rehabilitation Medicine, Madurai, Tamil Nadu

**Dr Natasha Lannin, Australia**  
Occupational Therapist and Senior Research Fellow, Rehabilitation Studies Unit, Sydney Medical School  
Chair, Scientific Committee of the Occupational Therapy Australia

**Dr Roy Lee, Singapore**  
Senior Consultant, Department of Rehabilitation Medicine, Changi General Hospital
Professor Ming Liu, China
Professor of Neurology and Deputy Director of the Department of Neurology at the West China Hospital, Sichuan University

Dr Johnny Lokin, Philippines
Assistant Professor, College of Rehabilitation Sciences and Faculty of Medicine and Surgery
University of Santo Tomas

Professor MM Mehndiratta, India
Professor of Neurology, G. B. Pant Hospital, Delhi University Hospital, New Delhi
Chairman, Scientific Committee, Asia Pacific Stroke Organization

Dr Firdosi Rustom Mehta, WHO
WHO Representative to Sri Lanka

Professor Shanthi Mendis, Sri Lanka
Senior Adviser/coordinator, World Health Organization cardiovascular and noncommunicable diseases programs

Dr Kazuo Minematsu, Japan
Deputy Director General, National Cerebral and Cardiovascular Center (NCVC), Osaka
President, Japan Academy of Neurosonology
Professor Jusuf Misbach, Indonesia

Dr Huy Thang Nguyen, Vietnam
Consultant Stroke Neurologist, People’s 115 Hospital, Ho Chi Minh City
General Secretary of the National Stroke Association of Vietnam

Professor Bo Norrving, Sweden
Professor in Neurology, Lund University
President of the World Stroke Organisation

Dr Jeyaraj Pandian, India
Professor and Head of Neurology, Christian Medical College (CMC), Ludhiana, Punjab

Dr Charitha Perera, Australia
Rehabilitation Medicine Physician, Repatriation General Hospital, Adelaide

Dr Michael Pollack, Australia
Senior Staff Specialist, Rehabilitation Medicine, Newcastle
Clinical Director Rankin Park Centre for Aged Care and Rehabilitation, Hunter New England Local Health District
**Professor Niphon Poungvarin, Thailand**  
*Professor of Neurology, Faculty of Medicine Siriraj Hospital, Mahidol University, Bangkok*

**Dr N V Ramani, Singapore**  
*Senior Consultant, Division of Neurology, University Medical Cluster  
Associate Professor, Department of Medicine and Department of Epidemiology and Public Health, Yong Loo Lin School of Medicine*

**Dr Udaya Ranawaka, Sri Lanka**  
*Senior Lecturer, Department of Medicine, Faculty of Medicine, University of Kelaniya  
Honorary Consultant Neurologist, Colombo North Teaching Hospital, Ragama  
Vice President, National Stroke Association of Sri Lanka*

**Professor Peter Sandercock, UK**  
*Clinical Neurologist, Western General Hospital, Edinburgh  
Director of Edinburgh Neuroscience  
Co-chief investigator of the third International Stroke Trial (IST-3)*

**Professor Maher Saqqur, Canada**  
*Associate Professor, University of Alberta, Department of Medicine, Edmonton AB*

**Professor Rohini Seneviratne, Sri Lanka**  
*Professor in Community Medicine, University of Colombo, Sri Lanka  
Chairperson, Board of Study in Community Medicine, Postgraduate Institute of Medicine, University of Colombo*
Dr Vijay Sharma, Singapore
Consultant Neurologist, National University Hospital
Associate Professor, Yong Loo Lin School of Medicine, National University of Singapore

Professor Yukito Shinohara, Japan
President, Asia Pacific Stroke Organization
Chairman, Department of Neurology, Tokai University School of Medicine
Director, Federation of National Public Service Personnel Mutual Aid Associations
Tachikawa Hospital

Professor P N Sylaja, India

Dr S Uchiyama, Japan
Professor and Chair, Department of Neurology, Tokyo Women's Medical University

Dr Mohammad Wasay, Pakistan
Associate Professor in Department of Medicine, Division of Neurology, Aga Khan University, Karachi

Dr Tissa Wijeratne, Australia
Senior Consultant Neurologist and Director, Stroke Unit and Neuroscience Research Unit, Western Hospital, Melbourne
Senior Lecturer in Medicine, Western Health Clinical School, University of Melbourne
Dr Lawrence Wong, Hong Kong
Mok Hing Yiu Professor of Medicine, Chinese University of Hong Kong
Chief of Neurology, Prince of Wales Hospital

Professor Byung-Woo Yoon, South Korea
Professor of Neurology, Seoul National University Hospital, Seoul
30th September 2011

Plenary – Stroke burden in the Asia Pacific region from 1990-2010: updates from the Global Burden of Disease Project
Valery I. Feigin, on behalf of the GBD Stroke Experts Group
National Institute for Stroke and Applied Neurosciences, AUT University, Auckland, New Zealand

Stroke remains the second most common cause of death worldwide. Although there is good quality data on stroke epidemiology in Australia and NZ, there is a paucity of such data for the majority of the countries of Asia Pacific region, largely represented by developing countries. Using the updated DisMod III methodology and available stroke epidemiological data of the GBD Project for 1990-2005 period, we show that stroke incidence in most of the Asia Pacific region countries (except Australia, NZ and Japan) is one of the highest in the world, while stroke prevalence is one of the lowest in the world.

Symposium – Acute management of stroke
1. Stroke syndromes
Mehndiratta M M
Director, Professor of Neurology, Department of Neurology, G.B. Pant Hospital, New Delhi, India

Stroke syndromes are classified in to three types; lacunar strokes, stroke caused by thrombotic occlusion of the major intracranial vessels, and brainstem stroke. Though well-defined syndromes, still it may be difficult to differentiate clinically between lacunar, large-vessel, and brainstem infarction.

Lacunar strokes are caused by ischemia within the deep arterioles caused by a process of lipohyalinosis. Pure motor hemiparesis, pure sensory syndrome, ataxic hemiparesis and dysarthria with clumsy hand syndrome are four major lacunar syndromes. Angiographic studies are usually normal because of the involvement of small vessels. Systemic thrombolysis is effective in these strokes despite the lack of visualized thrombus. These strokes carry good prognosis.

The second typical stroke syndrome is caused by thrombotic occlusion of the major intracranial vessels. This produces large, wedge-shaped cortical infarction. This stroke subtype often has a poor prognosis. The cause is either atheroembolism, cardioembolism or spontaneous thrombosis resulting from hypercoagulable states. Angiography can visualise the thrombus in 80% of cases.

Brainstem stroke is another stroke syndrome subtype. Brainstem stroke may be caused by either small-vessel (pontine perforating) or large-vessel (basilar artery) involvement. Brainstem ischemia can have variable clinical manifestations including cranial neuropathy, hemiparesis, and altered levels of consciousness. Involvement of posterior cerebral artery leading to occipital infarction usually manifest with visual field defects.

The Oxford Community Stroke Project classification (OCSP, also known as the Bamford or Oxford classification) relies primarily on the initial symptoms; based on the extent of the symptoms, the stroke episode is classified as total anterior circulation infarct (TACI), partial anterior circulation infarct, lacunar infarct (LACI) or posterior circulation infarct (POCI). These four stroke subtypes are predictor of the extent of the stroke, the area of the brain affected, the underlying cause, and the prognosis. The TOAST (Trial of Org 10172 in Acute Stroke Treatment) classification is based on clinical symptoms as well as results of further investigations to sub classify ischemic stroke; on this basis, a stroke is classified as being due to (1) thrombosis or embolism due to atherosclerosis of a large artery, (2) embolism of cardiac origin, (3) occlusion of a small blood vessel, (4) other determined cause, (5) undetermined cause (two possible causes, no cause identified, or incomplete investigation).
2. Thrombolysis for ischaemic stroke in Japan

Yukito Shinohara

Federation of National Public Service Personnel Mutual Aid Associations, Tachikawa Hospital, Tokyo, Japan

Although intravenous administration of tissue-plasminogen activator (t-PA) was given a Grade A recommendation in the Japanese Stroke Guidelines 2004, the use of t-PA had actually not yet been approved by the Japanese Ministry of Health, Labour and Welfare (JMHLW) at that time. The reasons for the delay were the lack of clinical trials in Japanese patients and cautiousness of the JMHLW on the grounds that East Asians may bleed more easily than Caucasians. For these reasons, the Japan Alteplase Clinical Trial (J-ACT) using 0.6 mg/kg of Alteplase (instead of 0.9 mg/kg) was conducted from 2002 to 2003. The results showed that the dose of 0.6 mg/kg was not inferior to 0.9 mg/kg in either efficacy or safety. Following lengthy negotiations between the Japan Stroke Society (JSS), companies dealing with Alteplase and the JMHLW, in which the results of J-ACT were taken into consideration, the use of t-PA was finally approved by the JMHLW in October 2005, and certainly use of t-PA was added in new Japanese Guidelines 2009.

Strict standards were set for hospitals authorized to conduct IV thrombolytic therapy, including [1] 24 hour availability of CT or MRI, [2] treatment in a SCU, SU or equivalent, by a special stroke team, [3] immediate availability of neurosurgical management, and [4] experience in treating more than 50 acute stroke patients per year or, if not, attendance at a seminar conducted by JSS. Furthermore, the JMHLW also requested the JSS and the Japanese companies dealing with t-PA to ensure that all patients who received t-PA should be followed up for at least 2.5 years after approval, in a post-marketing survey. The results of the post-marketing survey, which was called J-MARS, were reported in Stroke. It was found that the ratios of mRS 0 and 1 (good outcome) and mRS 6 (worst outcome) at 3 months in the subgroup consisting of patients between 18 and 80 years old with NIHSS less than 25 in J-MARS and the European study SIT-MOST were almost exactly the same.

Therefore, the dose 0.6 mg/kg of t-PA appears to be appropriate at least in Japanese stroke patients. In the first year of t-PA’s availability in Japan, we used t-PA in 3,200 patients, corresponding to only about 1.4% of the ischemic stroke patients in Japan. To improve this situation, in the area covered by my hospital and several other hospitals, we set up a t-PA calendar, together with an intensive education program for the public and emergency medical technicians (EMTs). This system was later expanded to cover the whole Tokyo area, and finally the Protocol of the Stroke Emergency Medical-Care System for EMTs was developed for the whole Tokyo area. We subdivided Tokyo into 12 small areas, and each area had its own EMT team and t-PA calendar.

Recent data show that t-PA usage in the Tokyo area currently corresponds to almost 7 to 8% of all ischemic stroke patients. Of course, efforts to extend the available therapeutic time window for t-PA treatment are also essential. However, use of t-PA outside the current time period is not yet approved in Japan, because so far there has been no trial of such usage in Japanese patients.

References


3. Imaging and neurovascular intervention in stroke – a practical view

Paul Butler

Consultant Neuroradiologist, Barts and the London NHS Trust, London, UK

Barts and the London NHS Trust has an established service for the acute management of stroke. The lecture will focus on the contribution of the radiology department in both diagnosis and treatment, notably arterial rescue procedures. As practised in our institution, arterial rescue procedures are not complex and can usually be completed in a relatively short time. Factors influencing a successful outcome will be discussed.
4. Management of malignant MCA
N Venketasubramanian Ramani
National University Health System, Singapore

“Malignant” middle cerebral artery (MCA) infarctions comprise 1-10% of supratentorial ischaemic strokes. This condition tends to occur within the first week of stroke onset. Patients show progressive deterioration of conscious levels over 24-48 hours and may require ventilatory support. Left untreated, it carries a mortality of up to 80%. If aggressive management is planned, this is best performed in the setting of an intensive care unit. Osmotic compounds reduce intracranial pressure, but their efficacy has not been supported by randomized controlled clinical trials. Head elevation, barbiturates, hyperventilation are also unproven. Moderate hypothermia favourably affects the ischaemic cascade and may reduce mortality. A pooled analysis of early hemicraniectomy revealed a substantial decrease in mortality at 6 and 12 months as well as improved functional outcome among patients younger than 60 years of age. However, there is still significant disability among survivors. It is uncertain if older patients or those with dominant lobe infarctions should be denied surgery. Further research is needed to develop better treatments for this devastating and lethal complication of ischaemic stroke.

11.30 am

Symposia

Hall A – Getting the evidence and understanding the evidence

1. Systematic reviews of clinical trials of treatments for stroke
Peter Sandercock
UK

Well conducted systematic reviews can provide a convenient summary of the available best evidence on a particular treatment, that is up-to-date, comprehensive, and is as free from bias and random error as possible (within the limits of the available data). The Cochrane Stroke Group has prepared over 150 such reviews relevant to the treatment, prevention and rehabilitation of stroke, which are periodically updated as new evidence becomes available. Many of these reviews have informed national stroke guidelines in countries around the world. The abstracts of these reviews are available free of charge at http://www2.cochrane.org/reviews/en/topics/93_reviews.html

This talk will cover some of the systematic reviews of common treatments used (and abused) in the management of acute ischaemic stroke, e.g. thrombolysis, antiplatelet therapy and anticoagulants and methods for preventing venous thrombo-embolism and, for haemorrhagic stroke, surgery and haemostatic agents.

2. Conducting stroke research: opportunities for collaboration between developed and developing world
Craig Anderson
Professor of Stroke Medicine and Clinical Neuroscience, The George Institute for Global Health, Royal Prince Alfred Hospital and University of Sydney, Australia

Clinical research is vibrant and increasingly active in the developing regions of Asia and other similar parts of the world. However, such research, particularly randomised controlled trials, present increased challenges to clinicians, health-care systems and administrators as populations in these countries continue to undergo rapid demographic, economic and cultural changes. Economic development provides many benefits, for example socio-economic improvement, increased education, up-skilling of the medical workforce, greater access to health technology and therapies, and improved engagement with the international community. This has also brought about a rapid rise in industry-sponsored randomised clinical trials of drug and device therapies, although sometimes this has been driven by perverse incentives related to lower costs for organisation, recruitment and monitoring of the large numbers of high-risk participants who have limited competing therapeutic alternatives in these settings.
There are ongoing challenges related to both the scientific quality and ethical conduct of clinical trials. As well as ensuring adherence to the usual quality parameters of randomisation, data accuracy and completeness, adherence and completeness of follow-up, there are several particular issues that are of some concern which include: obtaining informed consent, medical indemnity compensation for adverse events, ethical committee oversight, and financial compensation for clinical site investigators.

Enormous opportunities exist to further enhance research low-medium income countries, through the provision of strong leadership and strategic academic and research partnerships with people and institutions in western countries. In keeping with various research ethics policies, clinical research conducted in developing countries should benefit the local people, and ideally foster development of local research capacity and public-health policy.

This talk will draw on the speaker’s experience in conducting academic randomised controlled trials in the area of stroke in Asia over the two decades.

3. New clinical evidences on thrombolysis and neuro-protective agents

Kazuo Minematsu
National Cerebral and Cardiovascular Center, Osaka, Japan

The author contributed to accomplish a phase III clinical trial named Japan Alteplase Clinical Trial (J-ACT; Stroke 2006; 37: 1810-15), that examined the efficacy and safety of intravenous (i.v.) thrombolytic therapy with 0.6 mg/kg of a recombinant tissue-type plasminogen activator (rt-PA), alteplase. The study indicated that alteplase, when administered at 0.6 mg/kg to Japanese patients, might offer a clinical efficacy and safety that are comparable with data reported in North America and the European Union (EU) for a 0.9 mg/kg dose (N Engl J Med 1995; 333: 1581-87). Japanese guidelines of i.v. alteplase therapy (Jpn J Stroke 2005, Int J Stroke 2008; 3: 55-62) were issued immediately after the approval of this therapy by the Japanese government in October, 2005.

In this symposium, the author reviewed results of clinical studies performed in Japan after the approval of alteplase in 2005, which included the SUMO study (Stroke 2009; 40; 30-34), the NCVC rt-PA Registry (Int J Stroke 2009; 4: 425-31), the SAMURAI Register (Stroke 2009; 40: 3591-5, Neurology 2010; 75: 555-61, Cerebrovasc Dis 2011; 31: 123-9, Stroke 2011; 42: 2196-2200, Eur Neurol 2011;66:37-41, J Neurol Sci 2011; 306: 49-53, Stroke 2011 in press), a clinical trial of J-ACT II (Stroke 2010; 41: 461-5, Stroke 2010; 41: 2828-33), and the nation-wide post-marketing registry of J-MARS (Stroke 2010; 41: 1984-89). These studies suggest that thrombolysis with 0.6 mg/kg intravenous alteplase could be comparable to those with 0.9 mg/kg alteplase used in North America and the EU (Wahlgren N, et al. Lancet 2007; 369: 725-82).

Edaravone, expected to display a neuroprotective effect, has been recommendable (Grade B) for patients with acute cerebral infarction within 24 hours after stroke onset in the Japanese guideline, being based on Japanese reports (Cerebrovasc Dis 2003; 15: 222-9, Cerebrovasc Dis 2009; 27: 485-92).

For these years, many clinical studies have been performed to prolong the therapeutic time window from the initial 3 hours to the 4.5 hours by using alteplase (Wahlgren N, et al. Lancet 2008; 372: 1303-09, Hacke W, et al. N Engl J Med 2008; 25: 1317-29) and to the 9 hours with a new rt-PA, desmoteplase, and to develop intravascular devices such as Merci and Penumbra, sonothrombolysis, a combination of thrombolysis with neuroprotective agents such as edaravone, and hybrid revascularization therapy. These new therapeutic strategies are also going on to be tested clinically in Japan, and some of them are presented briefly in this symposium.

4. Clinical trials in Sri Lanka

Asita De Silva, Sri Lanka
Hall B – Challenges of post stroke care

1. Neuro-critical care of stroke
Johnny Lokin, Philippines

2. Management of complications
P N Sylaja, India

3. Post-stroke spasticity and disability
Michael Branin, Austria

4. Neuro plasticity and stroke recovery
Harnessing brain plasticity to improve stroke outcome
P Alan Barber
Professor of Clinical Neurology, University of Auckland, New Zealand

Many of those who survive stroke will be left with disability that causes some reliance on others for performance of activities of daily living. Most stroke survivors show some recovery of function. This may be marked in the first days and weeks after stroke but may continue at a slower rate up to and beyond 12 months. There is significant heterogeneity in the degree and speed of stroke recovery between individuals and even across different domains in the same individual. One of our key challenges is to determine these mechanisms of stroke recovery and use this knowledge to develop new rehabilitation therapies.

Little is known about the neural mechanisms that underlie stroke recovery. True ‘recovery’ with the re-emergence of identical motor and sensory circuits damaged by stroke is rare. Studies have shown that the brain has the capacity for self-repair but is limited in mounting a regenerative response. Neural stem cells proliferate in the subventricular zone and may even migrate to the site of damage. However, these cells die before they integrate and function as mature cells. Instead, recovery usually refers to “behavioral compensation”, where remaining and new brain circuits form between intact parts of the brain and bypass or take over the function of stroke-damaged circuits. This neural plasticity can occur because of the significant redundant and diffuse “connectivity” that persists in the stroke-damaged brain.

Following stroke, peri-infarct and connected regions become relatively more ‘excitable’ with increases in NMDA receptor binding and down regulation of GABA receptors. At the same time axonal sprouting and synaptogenesis lead to a strengthening of surviving connections and the unmasking of latent circuits. The strength of these new synaptic connections is increased and refined by environmental stimuli including rehabilitation therapy. This facilitates the re-mapping of function with increased activation in regions distant but connected to the stroke damaged brain. Shifts in ‘lateralisation’ of activity from the ipsilesional to contralesional hemisphere are seen, with smaller activation shifts seen in patients with lesser functional deficit.

There are currently few options to promote stroke recovery apart from the mainstays of physical, occupational, and speech and language therapy. Strategies shown in phase III randomized controlled trials to be of benefit include the use of serotonin re-uptake inhibitors and constraint induced movement therapy. However, there is a much wider range of therapies still under investigation, including growth factors, coordinated movement patterns and non-invasive brain stimulation. In the near future we will need strategies to guide the optimal prescription of treatment in individuals as it is unlikely that there will be “one size fits all” stroke rehabilitation.

In this presentation, the concepts of recovery, connectivity, neural plasticity and behavioural compensation will be introduced. Strategies that have the potential to enhance neural plasticity and improve functional outcome following stroke will be discussed.
Asian stroke: does it differ from Western stroke?

1. What are the stroke etiologies particularly seen in Asians?

Jeyaraj D Pandian
Professor and Head of Neurology, Christian Medical College, Ludhiana, Punjab, India

There is a rising burden of stroke in Asia. Most of the Asian countries face a double burden of communicable and non-communicable diseases like stroke. The high prevalence of lifestyle related risk factors in these countries contribute to the rise in the incidence of stroke. In addition to the conventional risk factors for stroke in Asia there are many other etiologies which are common in these regions. Cerebral venous thrombosis during the peripartum and the post partum period is a common cause of stroke in young women in the Indian sub-continent. Besides this many central nervous system infections can produce stroke particularly tuberculous meningitis, pyogenic meningitis, HIV/AIDS, neurocysticercosis etc. There are emerging infections like dengue fever which can also present with stroke. Moya moya disease is another common etiology of stroke in many Asian countries particularly in Japan.

2. Intracranial atherosclerosis and branch atheromatous disease; a prevalent problem in Asians

Jong S. Kim
Department of Neurology, Asan Medical Center, Seoul, South Korea

Intracranial atherosclerosis (ICAS) is considered a cause of approximately 8% of all strokes in white population. However, the frequency of ICAS is much higher in Asian countries. In our hospital-based registry, among the patients who had angiographic abnormalities, the frequency of ICAS was approximately 70% far exceeding that of extracranial atherosclerosis (ECAS). Unlike ECAS, ICAS produces stroke with much diverse mechanisms. One of the important mechanisms is a branch occlusion producing single subcortical infarction (SSI). SSI, a traditionally called lacunar infarction, has been considered to be caused by lipohyalinosis of small perforating arteries. However, recent imaging techniques have shown that SSI produced by parental artery disease (SSIPAD) is more common than realized especially in the brain stem. Another similar but confusing term ‘branch atheromatous disease’ has been introduced, and the similarity and differences will be discussed.

SSIPAD is an important stroke subtype, especially in Asian populations. Although the clinical and imaging characteristics of SSIPAD are similar to SSI caused by small vessel disease (SVD), SSIPAD is more often associated with characteristics of atherosclerosis, and fluctuating and a poorer prognosis. SSIPAD has been neglected in previous stroke subtype classifications as well as in clinical trials assessing prevention and treatment.

It is concluded that SSIPAD is one of the main causes of SSI, distinct from SVD, illustrating that greater efforts should be made in the accurate diagnosis of SSIPAD in various parts of the world. Studies are needed to investigate the incidence of SSIPAD and to design a stroke classification system that includes SSIPAD. Prevention and treatment trials should consider this important subgroup of stroke in Asian countries.

3. Risk-benefit profile of anti-platelet therapy in Japanese stroke patients

Shinichiro Uchiyama
Professor and Chairman, Department of Neurology, Tokyo Women’s Medical University, Japan

Aspirin is the most widely-used antiplatelet agent in Japan as in other Asian countries. However, According to the latest meta-analysis by the Antithrombotic Trialists’ Collaboration, risk reduction of subsequent stroke by aspirin is only 19% and relative risk increase of hemorrhagic stroke by aspirin is 67%. Therefore, risk-benefit profile of aspirin for secondary stroke prevention is never
ideal. Clopidogrel is marginally more efficacious than aspirin for secondary stroke prevention. However, clopidogrel resistance is much argued with CYP2C19 polymorphism, which is more prevalent in Asian including Japanese than Caucasian.

According to the results of PROFESS, recurrent stroke was comparable between patients on aspirin plus extended-release dipyridamole and patients on clopidogrel, while intracranial hemorrhage was more frequent in patients on aspirin plus extended-release dipyridamole than in patients on clopidogrel. We conducted JASAP study, which was a randomized controlled trial of aspirin plus extended-release dipyridamole versus aspirin alone, in Japanese stroke patients. We could not show non-inferiority of aspirin plus extended-release dipyridamole in this trial. We analyzed the effects of blood pressure and its variation in patients enrolled into the JASAP study. Mean systolic blood pressure was significantly higher in patients with than without ischemic stroke, while standard deviation of variation of systolic blood pressure was significantly larger in patients with than without intracranial hemorrhage. Therefore, it is crucial to reduce variation of blood pressure in order to reduce the risk of cerebral hemorrhage in Japanese patients under antiplatelet therapy.

We performed a meta-analysis of randomized placebo-controlled trials of cilostazol for stroke prevention in patients with atherothrombosis. A total of 5,674 patients involved in 12 trials including 9 peripheral artery disease, 2 cerebrovascular disease, and 1 coronary artery disease trials). Our meta-analysis showed 42% risk reduction of cerebrovascular events without any increase of bleeding risk. Then, we performed CSPS II, an aspirin-controlled, double-blind, randomized non-inferiority trial of cilostazol in Japanese stroke patients. Recurrence of stroke was significantly less frequent in patients on cilostazol than in those on aspirin, and bleeding events were much less frequent in patients on cilostazol than in those on aspirin. Additionally, we made a subgroup analysis according to the subtypes of ischemic stroke. The result showed that rate of hemorrhagic stroke was much lower in patients on cilostazol than in those on aspirin among patients with lacunar stroke. This risk-benefit profile of cilostazol indicates an advantage over aspirin especially in patients with lacunar stroke, which is more common in Asian than Western stroke patients.

Annual incidence of cerebral hemorrhage with aspirin in clinical trials for secondary stroke prevention was 0.17% to 0.44% in global trials including CAPRIE, CHARISMA, MATCH, and PROFESS, while it was 0.84% to 1.00% in Japanese trials including S-ACCESS, JASAP, and CSPS II. We should take this ethnic difference in the risk of cerebral hemorrhage into consideration for the selection of antiplatelet drugs for stroke prevention in Japanese and presumably also other Asian stroke patients.

Symposium – Public health issues related to NCD

1. Post UN High-level Meeting: What next for NCDs?

Shanthi Mendis, Sri Lanka

Currently, CVDs (heart attacks and strokes) and other NCDs represent a leading threat to global health and development. Together, they are responsible for 60% of deaths globally and are projected to rise further. Around 80% of these deaths are in low and middle income (LMICs), which can least afford the social and economic consequences they bring. It is estimated that more than eight million deaths from NCDs before the age of 60 occur every year in LMICs. Most of these premature deaths are due to heart attacks and strokes and many could be preventable if public policies involving all government departments were established and cost effective health care interventions are implemented through a primary health care approach.

There are new and complex dimensions to the NCD problem in LMICs. Many LMICs are now beginning to suffer from a quadruple burden: NCDs, communicable diseases including HIV/AIDS, violence and injuries; and mental diseases. They also have a double burden of undernutrition and obesity. In addition, infant and maternal mortality rates in many low-income countries are deplorably high. There is clear evidence that poor nutrition during pregnancy and the first two years of life predisposes individuals and populations to the development of CVD and diabetes later in life. Furthermore, NCDs are also linked to the burden of HIV and tuberculosis, and recent analyses suggest that a significant reduction in the magnitude of NCDs would impact positively
on the progress towards the achievement of the MDG. Postponing action to address NCDs will compound the situation further and destroy the health gains that have resulted from years of investment in combating communicable diseases and maternal and child health.

Prevention of NCDs is essential for sustainable development. Progress in poverty alleviation efforts and attainment of MDGs will be compromised if the impact of the global NCD epidemic on socioeconomic development is ignored.

In consecutive sessions, in May and December 2010, the UN General Assembly adopted resolution 64/265 (Prevention and control of NCDs) and resolution 65/238 (Scope, modalities, format and organization of the High-level Meeting on NCDs). The resolutions related, respectively, to the convening of and detailed organizational arrangements for a High-level Meeting of the UN General Assembly on the prevention and control of NCDs.

As mandated by resolution 65/238, the High-level Meeting which was held on 19-20 September 2011, has resulted in a concise action-oriented Outcome Document. The Outcome Document is intended to generate global momentum and commitment both in implementing the WHO Global NCD Action Plan (WHA53.17) and its Action Plan (WHA61.14) and to the “inclusion of the prevention and control of NCDs as an integral part of the global development agenda and related investment decisions”. The world’s political leaders have taken a historic step to give unprecedented attention to the fight against NCDs in order to adequately address the developmental challenges posed by NCDs.

2. Public Health issues related to NCD: Regional perspective

Firdosi Rustom Mehta
Country Representative, Sri Lanka – World Health Organisation

The growing burden of noncommunicable diseases (NCDs) threatens economic and social development as well as the lives and health of millions of people in the South-East Asia Region. NCDs can be prevented and treated through interventions that reduce the level of exposure to the risk factors and strengthen health care for people with NCDs.

WHO’s South-East Asia Region (SEAR), comprising 11 Member States, is home to 1.8 billion people or 26% of the world’s population and 40% of the world’s poor. Two countries in the Region, India and Indonesia, are among the world’s five most-populous countries. In less than two decades, life expectancy at birth in this Region increased from 58 for males and 59 for females to 63 for males and 66 for females. Of the 11 Member States in the Region, none are in the high-income group, seven are low-to-middle income and four are low-income. The Region has been undergoing rapid economic development over the past few decades; however, economic growth has not been equitable. The Region, even today, has one of the lowest expenditures on health as a percentage of the gross domestic product (3.6 %), among all WHO regions and the highest out-of-pocket expenditure among all WHO regions (87%). Also, the social security expenditure on health as a percentage of general government expenditure on health is only 13.8%, the lowest among all WHO regions.

Currently, NCDs are the top killers accounting for 8 million deaths each year or 54% of all deaths in the Region. Nearly 30% of NCD deaths are premature occurring below the age of 60 years. NCD-related deaths in the Region occur a decade earlier compared to the Western countries. The high and rising prevalence of risk factors for NCDs is alarming. The Region has nearly 250 million smokers and 234 million users of smokeless tobacco. Childhood and adult obesity, the key determinants of NCDs, are on the rise. Eighty percent of the population does not eat sufficient quantities of fruits and vegetables. Up to one-quarter of adults do not engage in sufficient physical activity. Diabetes is prevalent in 5%-10% of the population of the Region. Up to 2 million new cases of cancer are estimated to occur each year. Approximately 30% of the population has hypertension. Annually, 1.5 million deaths can be attributed to hypertension alone. The NCD burden is expected to further increase and a 21% increase in NCD deaths is expected over 2006-2015 in SEAR which may overstretch the already fragile health infrastructure and reverse the health gains made so far.
Interventions to prevent NCDs on a population-wide basis are not only achievable but also cost-effective. And the income level of a country or population is not a barrier to success. Low-cost solutions can work anywhere to reduce the major risk factors for NCDs. While many interventions may be cost-effective, some are considered ‘best buys’ – actions that should be undertaken immediately to produce accelerated results in terms of lives saved, diseases prevented and heavy costs avoided. These include Tobacco and Alcohol legislation and also reduction in salt content of food. In addition to population-wide interventions for NCDs, country health-care systems should undertake interventions for individuals who either already have NCDs or who are at high risk of developing them. Evidence from high-income countries show, that such interventions can be very effective and are also usually cost-effective or low in cost. Eg: Aspirin therapy for acute MI. When combined, population-wide and individual interventions may save millions of lives and considerably reduce human suffering from NCDs.

Clearly, NCDs are a health, societal and development challenge of unprecedented scale both globally and in the Region. Unless these are addressed with the urgency they deserve, health and economic gains made in the Region in the recent years could be reversed. Since they affect all age and population groups including both the rich and poor, addressing NCDs is everyone’s business. The crisis of avoidable NCD burden and deaths in low- and middle-income countries should be a major focus for the global health community.

The WHO Regional Office for South-East Asia (SEARO) in conjunction with the Ministry of Health, Indonesia organized a regional meeting, during 1-4 March 2011, to discuss the health and development challenges of NCDs. A total of 103 participants, representing the national governments of all the 11 Member States of the Region, nongovernmental organizations, private sector, academia, other civil society partners and international agencies, attended the meeting. The meeting culminated in the Jakarta call for Action on NCDs. Following this meeting a national multistakeholder meeting was organized in Colombo on the 19th July in preparation for the UN high level meeting scheduled for 19th and 20th September. This Meeting provides an unprecedented opportunity to advocate for a multisectoral response, to mobilize the highest level of political commitment and to galvanize international response to this unprecedented health and development crisis. A further regional meeting is planned in November as a follow up to the UNGAS in November.

3. Public Health issues related to NCD: Sri Lankan perspective

Rohini de Alwis Seneviratne
Professor and Head Department of Community Medicine, Faculty of Medicine, University of Colombo, Sri Lanka

The advanced stages of the demographic transition and the epidemiological transition along with other socio economic policies of the successive governments and effects of globalization, urbanization and a rapidly ageing population in Sri Lanka have resulted in an escalation of the problem of non communicable diseases (NCDs) and their risk factors.

Worldwide, NCDs account for nearly two thirds of the 57 million deaths, a quarter of which are seen among those under 60 years. These are premature and preventable. Over eighty percent of the burden from NCDs is borne by the low and middle income countries of the world1.

The NCDs were the leading cause of death responsible for two thirds of the deaths in 2008, 30% being from the cardiovascular diseases (CVDs), 8.5% from chronic respiratory diseases, 9.4% from cancers and 3.9% from diabetes mellitus. The common CVDs include cerebro vascular diseases, coronary artery diseases and hypertension.

The NCD mortality presents only the tip of the iceberg with the hidden issues of chronic morbidity, consequences on quality of life, disability and the long term enormous expenditure on health care posing a burden on individuals, families and society at large. There are also adverse consequences on the development targets of the government and has contributed to the slowing down of the rapid rise of the life expectancy observed in the past in Sri Lanka.
The morbidity from NCD in 2004 from the total country disease burden was 51%. Of this NCD burden 17% were from CVD, 9% from cancer and 3.6% from diabetes.

Hypertension is estimated to account for half the CVD burden. In Sri Lanka the reported prevalence of hypertension for adult males ranges from 11-20% and among adult females from 10-13%. A more recent national survey has reported lower prevalence of 14% for males and 15% for females. Hospital admissions for hypertensive diseases more than doubled in the period from 1995 (298 per 100,000 population) to 2009 (612/100,000 population) in the state sector, indicating the rising burden of hospital care.

CVDs and diabetes mellitus have common risk factors of over weight and obesity, unhealthy diet, poor physical activity and tobacco and alcohol use, and common prevention strategies are thus feasible.

The importance of treatment of hypertension and control of blood lipids in the prevention of stroke cannot be emphasized enough. Treatment of raised blood pressure has been associated with a 35-40 per cent reduction in the risk of stroke and a 16 per cent reduction in the risk of myocardial infarction. Population strategy for control of hypertension through salt reduction itself warrants attention. It is clear that prevention of cerebrovascular accidents should be a part of the overall strategy for prevention and control of NCDs which share the common risk factors.

At national level the progress made in Sri Lanka to address the problem of NCDs include: the formulation of the national policy and strategic framework and for prevention and control of chronic non communicable diseases (2009) focusing on cardiovascular disease (cerebrovascular disease, hypertension and coronary heart disease) (3), diabetes mellitus, chronic respiratory disease and chronic renal disease; establishment of the unit for NCD prevention and control; appointment of the national NCD steering committee and the technical working group on NCDs; plans for re structuring and improving delivery of comprehensive NCD care through health systems improvement (strengthening of primary care, establishment of healthy lifestyle clinics, appointment of medical officer NCD to coordinate activities at district levels). Much work needs to be done on primary prevention, and health promotion strategy offers viable options specifically to address lifestyle risk factors supported by legislation and media inputs.

Above all, sustainable, cost effective and comprehensive strategies need to be translated into action quickly to address the huge problem of NCDs in Sri Lanka.

References

Symposium – Improving stroke services
1. Setting up acute stroke services and making them work
Michael Brainin, Austria

2. Strengthening care and support after stroke in the long term
Bo Norrving
Department of Clinical Sciences, Section of Neurology, Lund University, Sweden

During the last few decades the stroke field has achieved remarkable advances in the acute treatment of stroke, prevention of first and recurrent strokes, and rehabilitation in the short term. Advances
have been made in the fields of diagnostics, drugs, surgical techniques as well as in organizational system like stroke unit care. However, much less focus have been directed to the long term care and support after stroke, despite this being one of the fields always emphasized from stroke support organizations.

Annually it is estimated that 5.6 million persons die from stroke and there are about 10 million first ever strokes in the world – figures often cited when discussing the global burden of stroke. However, the prevalence number is estimated to no less than 30 million persons, about 40% of whom have moderate to severe disability and about half of whom are below the age of 60 years. Expected increasing absolute numbers of strokes and increased survival after stroke will yield even higher prevalent cases in the future. Disability after stroke is often life long. Many regions don’t have organized social services for persons with disabilities, placing a high burden on family members and carers.

Long term follow up after stroke should not only include secondary preventive issues by risk factor control, essential drugs and a healthy lifestyle but also address potential complications, need for further rehabilitation, activity and participation levels, information, and carer support. More than half of patients after stroke are left with motor impairments; one third or more with speech and language impairments; with time the risk of pain is 20-30%, poststroke spasticity 20%, depression 20-30%, and poststroke seizures 10%. Prevention and management of complications should be an integral part of long term management after stroke. Adequate follow up after stroke is clearly a complex and demanding task.

There are few (if any) areas of the world where long term support and care after stroke is optimal: many medical facilities (usually primary care) lack adequate knowledge on post stroke disabilities and complications, and re-referral systems to specialist care when problems arise are often non-existing.

Strengthening care and support after stroke in the long term should be a prioritized area for research and development in the near future.

3. Establishing stroke services in resource limited setting

Tissa Wijeratne, Australia

There has been a revolution in the management of stroke over the last three decades.

Availability of brain scanning, feasibility of primary prevention and secondary prevention has made a significant impact in stroke care at least in the developed world.

There is still much to do in the less privileged parts of the world as well as less privileged areas in the developed world.

How can we develop stroke services in the setting of fewer resources?

As Head of Stroke, Dr. Wijeratne has been responsible for developing the stroke services in the western region of Victoria (Western Health) which has limited resources in comparison to other regions in Victoria.

This paper will focus on development of teams and how they managed to deliver over the last five years through establishing their acute stroke services and ongoing care for stroke sufferers in the Western region of Victoria.

We will also address the ongoing collaborative work in establishing stroke services in Uva province through a similar approach.
Risk and outcome of intracerebral haemorrhage

Byung-Woo Yoon

Seoul National University Hospital, Seoul, Korea

Intracerebral haemorrhage (ICH) takes about 15% of first-ever stroke. ICH has worse outcome than ischaemic stroke. While rTPA has been approved to be effective in hyperacute ischaemic stroke, we do not have specific treatment for ICH yet.

Globally overall incidence of ICH is 24/100,000, which shows no significant decrease over the decades. The incidence of ICH has ethnic difference. It is notable that the rate in Asians is higher than double. Risk factors for nontraumatic ICH in the literature are hypertension, excessive alcohol, cerebral amyloid angiopathy, low cholesterol, old age, Asian ethnicity. According to INTERSTROKE study, a large scale case-control study, population attributable risk (PAR) of identified risk factors for ICH was about 85%, meaning need for identification of more risk factors. In addition to these known factors, cerebral microbleed, drugs such as phenylpropanolamine, and parity are emerging risk factors for ICH.

ICH has higher mortality than ischaemic stroke. A recent systematic review has reported that 1 month case fatality was 40%. Contrary to ischaemic stroke, the rate has not decreased over the decades. Japanese data showed much lower rate, 17%. It is not clear why they have low mortality. More aggressive treatment of ICH was suggested as a possible reason. Case fatality of ICH has been decreasing in Korea according to national health insurance claim data.

For ICH, poor prognostic indicators include old age, poor initial neurological condition, haematoma size, growth of haematoma, intraventricular extension, and brainstem location. High serum glucose level was suggested to be associated with 30-day mortality. ICH in patients with extensive white matter lesion on CT/MRI of the brain resulted in poor outcome. Obesity paradox is an interesting phenomenon suggested in congestive heart failure and coronary heart disease. Patients with overweight or obesity showed better survival than those with normal or low weight. Similar results have been found in patients with ICH.

Better understanding of risk factors and prognostic indicators will improve the prevention and management of patients with ICH, although we need to seek effective therapy for ICH.

References


Symposium

Prevention of stroke – an evidence based approach

1. Management of cardiovascular risk factors

Ruvan Ekanayaka
Consultant Cardiologist, Institute of Cardiology, National Hospital of Sri Lanka, Colombo, Sri Lanka

The global burden of cardiovascular disease (CVD) is massive but it appears that effective risk factor control has reduced the incidence in the developed countries by more than 50%, so that in the near future the greater burden will be on the less developed regions. The good news is that total risk management targeting all the modifiable risk factors will effectively prevent a large proportion of CVD and strokes.

The InterHeart study showed that 9 risk factors accounted for 90% of the PAR (population at risk) whereas the InterStroke Study revealed that 10 risk actors can explain 90% of new onset strokes. Many studies indicate that life style modification alone is associated with an 80% lower risk of vascular events. No medication or therapeutic intervention can give such massive beneficial effect and hence life style modification must take first line prominence. These include (i) increasing physical exertion (ii) cessation of smoking (iii) avoidance of environmental smoke (iv) moderation in alcohol consumption (v) maintaining normal BMR (vi) eating a low fat diet and (vii) increasing consumption of fruits and vegetables.

Therapeutic interventions for prevention mainly target S. lipids, blood pressure and diabetes mellitus.

The S. lipids must always be adequately controlled.

The S. LDL levels which are currently recommended would be:
- very high risk persons < 70 mg%
- high risk persons < 100 mg%
- moderate risk persons <115 mg%

Specific targets are not set for S. HDL but a value >55 mg% is ideal.

The ideal fasting S. TG levels have been reduced to < 150 mg%.

If life style modification alone cannot achieve these levels a statin must always be prescribed.

Blood pressure is a preventable cause of stroke and CVD. Every 2 mmHg rise in the systolic BP is associated with a 7 - 10% increased risk of CVD/ stroke mortality.

As white coat hypertension occurs in approximately 25% of the population, the new recommendations set values for ambulatory BP readings as well. The clinic BP readings follow the values given in the JNC VII.

The main recommendation for BP reduction remains life style modification as specified above. This alone can in most cases reduce systolic BP by 2 - 20 mmHg.

The current recommendations also specifically mention the 65+ and octogenarians. The targets now given are:
- 65 - 79 years – 140/90 mmHg
- Over 80 years – 145 mmHg systolic BP

The clustering of vascular risk factors has been termed Reaven’s syndrome X or metabolic syndrome. Whether this syndrome is a reality or not, what remains incontrovertible is the phenomenon of “clustering”. Of the many factors included in the metabolic syndrome, what is most applicable in our region is the waist circumference which is probably an indicator of visceral fat.

90 cm – for men
80 cm – for women
Controlling of blood sugar is of paramount importance. The pre-diabetic state is what must be targeted in CV risk factor control.

Pre-diabetic state is defined as:
IFG – 100-110 mg%
IGT – >140 mg%

Conversion of the pre-diabetic state to overt diabetes is most effectively prevented by life style modification consisting of caloric and fat restriction and exercise. Intense life style modification is more effective in this regard when compared to the use of metformin (which can be tried in the obese) or glitazone (which should be avoided anyway).

The WHO/ ISH risk prediction chart is a very useful tool to use for primary prevention.

The use of aspirin for primary prevention is now not recommended for all patients for either CV or stroke reduction. It is not to be universally given for all diabetics either, but could be considered in type I and II diabetics whose 10 year CV risk is over 10%.

As atherosclerosis commences in young age, the question arises when prevention should be commenced. Targets have now been set for children and adolescents and the interventions recommended are mainly the life style modifications.

In fact the main thrust in controlling the risk factors for CV disease is on life style modification. The only drug of value would be a statin.

2. Atrial fibrillation and stroke

Stephen Davis
Professor and Director of Neuroscience, Royal Melbourne Hospital and University of Melbourne, Australia

Atrial fibrillation has a lifetime prevalence of 25% in adults above age 40 years and is the cause of 15% of ischaemic stroke. In patients with cardiogenic stroke due to atrial fibrillation, the strokes are more severe in terms of clinical criteria and volume with increased mortality. Dose-adjusted warfarin, a vitamin K antagonist, has been the mainstay of therapy. A meta-analysis showed a 60% relative risk reduction over placebo and 40% over aspirin, although these were chiefly primary prevention trials. Warfarin is also superior to aspirin in secondary prevention and more effective than antiplatelet therapy with combined aspirin plus clopidogrel.

However, a range of newer anticoagulant strategies do not require monitoring and are likely to replace warfarin. Several agents have confirmed non-inferiority compared with warfarin and lower rates of major adverse effects. The first of these new agents to be licensed is Dabigatran, a direct thrombin inhibitor, shown to be superior to warfarin at the dose of 150 mg bid. Overall major bleeding risks were similar to warfarin at this dose, but there were significantly lower rates of intracranial haemorrhage. At the lower dose of 110mg bid, efficacy was similar to warfarin but with significantly lower major bleeding risks.

There have been two trials of factor Xa inhibitors, rivaroxaban and apixaban. Rivaroxaban was non-inferior to warfarin with lower bleeding risks. Apixaban was shown to be superior to aspirin in patients unable to tolerate warfarin. Apixaban has been shown to be superior to warfarin, with less bleeding and lowered mortality. Occlusion of the atrial appendage, the most common thrombotic nidus in atrial fibrillation, remains investigational.

3. Management of carotid stenosis: surgery or stenting – Asian perspective

Lawrence Wong, Hong Kong
Cardinal principles of stroke management

1. The educational mission of the WSO
Bo Norrving
Department of Clinical Sciences, Section of Neurology, Lund University, Sweden

The mission of the World Stroke Organization (WSO) is to provide access to stroke care and to promote research and teaching in this area that will improve the care of stroke by: 1. Promoting prevention and care of persons with stroke and vascular dementia, 2. Fostering the best standards of practice, 3. Educating, in collaboration with other international, public, and private organizations, 4. Facilitating clinical research. The educational part has been increasingly recognized as one of the most important functions of the society.

The educational programme “ABC of Stroke: Cardinal Principles of Stroke Management” was introduced at the Joint World Stroke Congress in Cape Town 2006, and has subsequently been conducted in China in 2007-2008, in Vietnam 2008, and in Seoul October 2010. In 2011 the Stroke ABC programme will be conducted in conjunction with the EFNS Congress, the current APSO Congress and the World Neurology Congress in Marrakesh. It will also be held at the World Stroke Congress in Brasilia 2012.

The Chengdu symposium had a tremendous success with over 1,000 participants from all over China, representing about 300 Chinese hospitals. In Vietnam, the training programme was carried on by a faculty under the leadership of the Chairman of the Neurological Society of Vietnam. 6000 doctors were exposed, either directly or indirectly, to the educational programme that was jointly supported by the Ministry of Health.

The World Stroke Academy (WSA) is a more recent project of the World Stroke Organisation (WSO) and aims at improving education on a global scale. It provides information about stroke and knowledge for health professionals and medical doctors, in order to improve prevention, therapy and management of stroke. A separate section is also available for patients, families, carers and anyone interested in stroke, which aims to improve general awareness of stroke and discuss issues important to these target groups. Education is provided by web based teaching modules on prioritized topics and are developed by world leading stroke authorities.

The educational program conducted by WSO under the leadership of Professor Michael Brainin, Chair of the Educational Sub-Committee, has reached stroke services caring for populations of more than 300 million persons, and is by far the largest ever educational activity in the stroke field.

2. The numbers and needs of stroke education in Asia
Lawrence Wong, Hong Kong

3. Early recognition and diagnosis of stroke
Stephen Davis
Professor and Director of Neuroscience, Royal Melbourne Hospital & University of Melbourne, Australia

Stroke is the most common serious neurological disorder, the second commonest cause of death worldwide, and a leading cause of long term adult disability. Acute stroke has a mortality rate higher than most forms of cancer. We are in the midst of a stroke epidemic, particularly occurring in low and middle income countries. There is substantial variation in stroke mortality around the world. Improved outcome depends on early recognition and accurate diagnosis. The new definition of stroke involves brain or retinal cell death due to prolonged ischaemia. This includes episodes lasting less than 24 hours and strokes that are clinically ’silent’.
Both ischaemia and haemorrhagic strokes are dynamic, evolving conditions and therapies for both stroke subtypes are aimed at limiting stroke growth. The chain of recovery in stroke depends on Recognition (both public and professional education), Reaction (speedy ambulance delivery to an emergency department), Response (rapid team work in the emergency department to assess the patient), Reveal (urgent imaging) and Rx-treatment (including stroke unit care, tPA, clot retrieval and new interventional therapies). FAST is a useful public education tool incorporating: F (facial weakness), A (arm weakness), S (speech difficulty), T (time to act fast).

Professional education should include conditions that mimic stroke, particularly common disorders including seizures, sepsis, toxic or metabolic encephalopathy, tumours, syncope, confusional states and vestibular dysfunction. Strokes are predicted by exact time of onset, the patient being well in the preceding week with definite focal signs or symptoms. An emergency department protocol is critical and the concept of 'Code Stroke' with mobilization of an expert stroke team is proven to enhance efficiency and rates of thrombolysis. Acute imaging with CT and MRI should be performed in the emergency setting and the patient rapidly admitted to a stroke unit. Stroke unit care should be universal.

4. Medical treatment of stroke
Peter Sandercock, UK

This talk focuses on the practical aspects of the most commonly applied evidence-based treatments for stroke that are available now. For all patients (irrespective of whether they have acute haemorrhagic or ischaemic stroke), this means admission to a comprehensive care stroke unit and the avoidance of treatments that are not supported by reliable evidence (graded compression stockings for DVT prevention, routine use of heparin for acute treatment or DVT prevention and neuroprotective drugs). For patients with proven acute ischaemic stroke, this means antiplatelet therapy with aspirin and intravenous thrombolytic therapy for selected patients, followed by early institution of secondary preventive measures (eg. oral anticoagulants for patients in AF, and urgent carotid endarterectomy for patients with symptomatic high-grade carotid stenosis. At present there is no evidence-based medical or surgical treatment specifically for routine use in patients with intracerebral haemorrhage.

5. Prevention of complications in acute stroke
Michael Brainin, Austria

6. Early mobilization of stroke patients
Bo Norrving

Organized stroke care into stroke units is the overall most efficient treatment for stroke because it applies to virtually all patients. Stroke units reduce death and disability after stroke by 14-22%. Common features of stroke units are multidisciplinary assessment and monitoring, physiological management, nursing care, early start of rehabilitation and early mobilization. Reduction in mortality from stroke unit care mainly occurs 1-4 weeks after stroke with effects mainly on deaths considered secondary to immobility.

In healthy individuals bed rest or immobility have profound effects on many body systems including cardiac fitness, muscular strength and endurance, bone density, glucose metabolism, protein anabolism, autonomic function and blood pressure regulation. Many of these effects are measurable already within few days.

In physical activity and training much focus have been directed towards achieving an activity level that is in the upper range of physical efforts. A common perception has been that low levels of physical activity do not provide any marked effects on health and well being. More recent research has shown that one of the key principles to stay healthy is to avoid immobility; the most
important dividing line is between doing nothing (bed rest) and sit or stand (sometimes called “non-exercise physical activity”), rather than to exercise vigorously for shorter periods. To stand rather than to sit appears to be one of the most important recommendations for practicing physical activity.

Early mobilisation should be tailored to the individual patient. The vast majority of patients have no contraindications to start of mobilization already the first day of stroke onset. A more cautious approach may be applied in particular in patients with moderate to severe stroke. During mobilization patients should be observed for worsening and symptomatic hypotension.

Observational studies from stroke units have shown that the timing and intensity of early mobilization varies. Studies have also shown that when measured across the 24 hours the majority of time is spent inactive, even in patients with mild strokes only. Studies determining the optimal level of mobilization are on-going.

Early mobilization is an integral part of acute stroke care and can be applied universally. Early mobilization may well be the single most important intervention in acute stroke care overall.

01. 00 pm

**Lunch Time Debate**

The ABCD2 score is a useful tool, applicable worldwide, to the clinical management of suspected TIA

*Speakers: Peter Sandercock vs Alan Barber*

02. 15 pm

**Symposium**

Care for stroke in the Asia Pacific region

1. Vietnam

Huy Thang Nguyen, Vietnam

**Stroke care and preliminary experience with recombinant tissue plasminogen activator in Vietnam**

T H Nguyen, L K Nguyen, T K T Ngo, T H Ho, T V Le

*Cerebrovascular Disease Department, People’s 115 Hospital, HCM City*

Intravenous (IV) thrombolysis is a proven therapy in acute ischaemic stroke (IS), but its use is relatively rare in developing countries such as Vietnam. Ho Chi Minh (HCM) city is the largest city in Vietnam with a population of more than 8 million people. The major obstacles are the cost of the drug, unawareness of stroke signs, and poor organization of emergency response and ambulance services. They result in a large number of patients being excluded from potential treatment because of late presentation to hospital, with only 8.7% of those arriving within 3 hours.

Since 2006, IV-tPA has been provided at three Stroke Centres in HCM city for acute stroke. We conducted an observational study of outcomes after IV-tPA in these 3 hospitals and the preliminary results just have been published recently. An important finding of this study was that 43% of patients receiving IV-tPA had an mRS 0-1 at 3 months. Importantly, low-dose IV-tPA was associated with a low mortality rate of 2.1% and a high 3-month functional independence rate of 56.3%.

Consequently, raising the awareness of the public and enhancing organizational aspects of acute stroke management have enabled better outcomes. There has been a dramatic increase in the number of stroke patients who received IV-tPA in our centre for years, with 59 patients in 2009 and 40 patients in the first 6 months of 2010. At the same time, we have begun to offer endovascular intervention with intra-arterial thrombolysis and mechanical thrombectomy for patients who failed IV thrombolysis or who presented within 3 and 6 hours.
In conclusion, our preliminary results provide further confirmatory evidence of the safety and feasibility of IV-tPA for treatment in Vietnamese patients with acute IS.

References


2. Sri Lanka

Udaya Ranawaka
Consultant Neurologist, Sri Lanka

Sri Lanka is a lower-middle income country with a GNI of 2200 USD per capita, a population of just over 21 million, and a population density of 319 per sq. km. Stroke is a major health problem in Sri Lanka. It ranks fourth in the leading causes of hospital mortality, and accounts for 16 deaths per 100,000 population. Prevalence of stroke in Sri Lanka is among the highest in the world. Sri Lanka has one of the fastest ageing populations in the world, and the burden of stroke on the Sri Lanka health care delivery structure is likely to increase.

Acute stroke care facilities remain inadequate and fragmented, and there is inequitable distribution of the limited resources available. For a population of over 21 million, there are only 25 neurologists, 20 government hospitals with CT scanners, and two stroke units. Rehabilitation facilities are scanty, and remain confined to the larger hospitals. There is a dearth of physiotherapists, speech therapists, occupational therapists, social workers and other health care workers to provide long term care.

However, several recent initiatives have shown that much can be achieved in spite of the constraints of facilities, manpower, or funding. The two stroke units and the thrombolysis programme at the National Hospital of Sri Lanka are cases in point. Opportunity abounds for improving stroke care in Sri Lanka. Over 40% of patients reach a hospital within 3 hours, highlighting the feasibility of developing a successful thrombolysis programme. The high literacy rate (over 90%) of the population can be an important factor in implementing educational programmes. Many patients (30-50%) still seek Ayurveda and other forms of alternative medicine, even after leaving a hospital, and a closer analysis of the reasons for this can help us understand deficiencies in the present systems of care, and perhaps develop a more integrated approach.

The National Stroke Association of Sri Lanka (NSASL) is a dynamic and vibrant patient-centred organization that has contributed much to improve patient support services. It has played a key role in implementing health education programmes, especially in the outstation areas of the country. The NSASL had the singular honour of being awarded the World Stroke Organization Gold Medal for the World Stroke Day activities in 2009.

3. Malaysia

Hamidon Basri, Malaysia

Stroke has been a major cause of mortality and disability in Malaysia. The burden of stroke is likely to increase substantially in the future especially due to expanding aging population. However, this can be minimised with better control of risk factors, public education, and improving stroke care and rehabilitation. Despite the importance of stroke, there have been very few prospective studies of stroke done in Malaysia. Based on available published data, there are significant differences in the pathological distribution of vascular lesions in the Malaysian population compared to the Caucasians. There are higher proportion of intracranial atherosclerosis, intracerebral haemorrhage and lacunar infarction compared to the western data. However it is still unclear whether the differences are absolute or due to differences in methodology and study design. One of the main problems faced by many developing countries (including Malaysia) is the late arrival of patients. This has resulted in delays in assessment, investigation and treatment.
Immediate recognition of stroke symptoms and rapid activation of the medical system are crucial factors in improving the outcome of acute stroke patients. For the past decade, recombinant tissue plasminogen activator (r-tPA) has been proven to be an effective treatment if given within 3-4.5 hours of stroke onset. The delays have led to a very low rate of thrombolysis in Malaysia. Overall, most data in Malaysia is derived from single centre, hospital-based registries. Further efforts need to be done to provide quality data and information of stroke in Malaysia. To improve the standard of care, knowledge and awareness of stroke in Malaysia, we have started the Kuala Lumpur Regional Integrated Stroke Intervention System (KRISIS). This will be further discussed.

4. Indonesia

Jusuf Misbach, Indonesia

5. China

Ming Liu

*Stroke Clinical Research Unit, Department of Neurology, West China Hospital, Sichuan University, Chengdu, China*

Stroke is the first cause of death in China. Far more patients suffered from stroke than from ischemic heart diseases. Evidence based stroke care has been promoted in recent 15 years and guidelines for stroke management have been developed since 2005. Most therapies recommended by guidelines are available for most hospitals. CT scanning is commonly used to assess acute stroke. Thrombolysis is underused and standard rehabilitation is not widely available. Stenting is more commonly used than CEA. Traditional Chinese Medicine (TCM) has been played an important role in treating stroke patients because so few proven specific western therapies for acute stroke can be used and TCM is generally regarded as harmless. At least one type of TCM or acupuncture, or both are regularly used in stroke patients in either western medicine hospitals or traditional Chinese medicine hospitals. Several systematic reviews or meta-analysis on TCM and acupuncture for acute stroke suggested that high quality randomized trials are needed to confirm or refute the effects of these traditional therapies. Future strategies for improvement of stroke care in China include to promote evidence based stroke guidelines development and widely implementation of these guidelines, and to conduct more high quality epidemiology studies and clinical trials for stroke care in China.
**OP-1**

The association between serum adiponectin and carotid intima media thickness in community based cohort in Korea

J Park, M Ahn, S Koh, S V Ahn

Yonsei University Wonju College of Medicine, South Korea

**Objectives:** Growing body of evidence suggests an association between circulating adiponectin and development of atherosclerosis. However, the results obtained were inconsistent for an independent association between adiponectin and subclinical atherosclerosis. We aimed to evaluate the association between circulating adiponectin and carotid intima media thickness (CIMT) in a large sample of individuals from the community.

**Methods:** We performed a cross-sectional study in samples of non-diabetic community-based cohort aged 40 years or older including 1353 Korean adults. We measured CIMT with a B-mode ultrasonography and the serum adiponectin concentrations by a radioimmunoassay.

**Results:** The mean adiponectin level was significantly lower in subjects with high CIMT defined by ≥ 0.9 mm than those with low CIMT (9.18 vs. 10.44 µg/mL, P=0.03). The adiponectin level was correlated negatively with waist circumference (r=-0.27), body mass index (r=-0.21), systolic blood pressure (r=-0.11), diastolic blood pressure (r=-0.10), triglyceride (r=-0.30), LDL-cholesterol (r=0.02), glucose (r=0.16), insulin (r=-0.17), homeostasis assessment-insulin resistance (r=-0.23) and C-reactive protein (r=0.11), and correlated positively with HDL cholesterol (r=0.30) (P<0.05 for all). Adiponectin was significantly associated with CIMT independently of age, sex, and all metabolic risk factors (R²=0.14, P=0.04).

**Conclusions:** Serum adiponectin levels are independently associated with CIMT as a surrogate of subclinical atherosclerosis in a non-diabetic community-based cohort.

**OP-2**

Early conscious disturbance in acute ischaemic stroke: incidence, risk factors and outcome

J Li, W Tao, W Dong, J Zhang, D Wang

The Stroke Clinical Research Unit, Department of Neurology, West China Hospital, Sichuan University, Chengdu, PR China

**Objective:** The prospective study was designed to explore the incidence and risk factors of early conscious disturbance in patients with acute ischaemic stroke. Outcomes in relation to conscious disturbance were also studied.

**Methods:** Data was collected on 569 consecutive patients admitted within 24 hours of onset of stroke. Conscious states on admission were clinically evaluated and measured by GCS score at baseline. Multivariate analysis was used to explore factors influencing early conscious states as well as the relationship between early conscious disturbance and outcome.

**Results:** A total of 199 patients (35%) suffered conscious disturbance on admission within 24 hours from stroke onset. Cardioembolism had the highest incidence (56.1%) of early conscious disturbance while small artery occlusion had the lowest (11.0%). The most common neurological complication in cases with early conscious disturbance was malignant oedema (30.2%) while pulmonary infection (58.3%) was the most common medical complication. The independent risk factors of early conscious disturbance were age (OR 1.027, 95% CI 1.007-1.048), high NIH score [1.331 (1.257-1.410)], massive cerebral infarct [3.211 (1.642-6.279)], high serum glucose [1.141 (1.055-1.235)], history of alcohol consumption [2.123 (1.030-4.375)], high diastolic pressure was a potential protective factor to keep off early conscious disturbance [0.983 (0.968-0.999)]. Multivariate analysis found both clinically defined early conscious disturbance and GCS score were not the independent predictor for death in the 3-month follow up, but were the independent predictor for 3-month death/disability [(adjusted OR 3.272, CI 1.670-6.413) and (adjusted OR 0.644, CI 0.537-0.772)].

**Conclusion:** Early conscious disturbance occurs in 1 out of every 3 patients with acute ischaemic stroke within 24 hours from onset and aetiology of cardio-embolism has the highest incidence. Age, NIHSS score on admission, massive cerebral infarct, glucose on admission and history of alcohol consumption are independent risk factors of early conscious disturbance. Early conscious disturbance is associated with high frequency of stroke-related complications and poor functional but not vital outcome.

**OP-3**

Post stroke depression: prevalence and determinants in Sri Lankan stroke patients

S A C U Gunawardhana, S C Somarathna, A Fernando, P S Gunaratne

Unit 2, Institute of Neurology, National Hospital of Sri Lanka, Colombo, Sri Lanka

**Introduction:** Post stroke depression (PSD) is one of...
the most important long-term adverse psychosocial consequences in stroke survivors. Its long term prevalence and the triggering factors are unknown in our community. Our objective was to assess the prevalence of PSD in Sri Lankan stroke patients and identify significant associated factors.

Method: One hundred consecutive patients who were admitted for inpatient rehabilitation following their first ever stroke were prospectively studied within 7 to 30 days of stroke onset. Patients with pre-existing disabling conditions and previous psychiatric disorders were excluded. The patients were evaluated by means of the modified Barthel Index (BI) and modified Rankin Scale (mRS) for stroke disability. Depression was assessed with Hospital Anxiety and Depression Scale (HADS) and Geriatric Depression Scale (GDS). Patients with a HADS-depression subscale score ≥11 and/or GDS score ≥8 were classified as depressed.

Results: One hundred stroke survivors were assessed (mean age: 67.3 years; 59.7% males). Half (46.7%) of the stroke patients had m-RS score ≤2 and BI ≤8. The proportion of stroke patients who scored ≥11 points on the HADS-depression was 29.6. One third (32.7%) had a GDS mean score ≥8. The prevalence of mood disorders was significantly higher in females than in males (34.8 vs. 24.2%; p = 0.03). PSD was significantly associated (p < 0.001) with education level and stroke disability in the multivariable regression analysis. The biological variables (cortical/subcortical distribution, laterality, aetiology and subtype of the stroke) were not statistically significant.

Conclusions: PSD is highly prevalent in our community and is associated with socio demographic variables and with the degree of disability.

OP-4

Fasting serum glucose and risk of stroke in men and women: an 11-year longitudinal study

S V Ahn, H C Kim, I Suh
Yonsei University Wonju College of Medicine, South Korea

Objectives: Diabetes is a well-known risk factor for cardiovascular disease. However, the blood glucose levels below diabetic range are not fully studied in relation with risk of stroke in general population. We investigated the relationships between fasting serum glucose levels and the risk of incident stroke in men and women.

Methods: We measured fasting serum glucose levels and other cardiovascular risk factors in 172,580 Korean adults (108,461 men and 64,119 women), aged 35-59 years in 1990 and 1992. Our primary outcomes were hospital admissions and deaths from ischaemic and haemorrhagic stroke in 11 year follow up from 1993 to 2003. Cox proportional hazard models were used to estimate the hazard ratios for stroke according to the baseline fasting serum glucose levels, after adjustment for age, body mass index, blood pressure, total cholesterol level, cigarette smoking, alcohol consumption and family history of diabetes.

Results: During the 11 years, 2,530 ischaemic and 1,477 haemorrhagic stroke events occurred. Fasting serum glucose levels of diabetic range (≥126mg/dL) were associated with increased risk of ischaemic stroke in men and women, and with haemorrhagic stroke in men. Impaired fasting glucose levels (110-125mg/dL) were associated with increased risk of ischaemic stroke in men. J-shaped association between fasting serum glucose levels and risk of ischaemic stroke was observed in women.

Conclusions: The association between fasting serum glucose and incident ischaemic stroke is J-shaped only in women. These findings may indicate the need for gender-specific strategies in stroke prevention.

OP-5

A large-scale, Australian genetic study of ischaemic stroke and its heritable subtypes

E G Holliday1,2,3, J M Maguire2,4,5,6, R J Scott7,8,9, C Levi5, J Attia1,2,3

1Centre for Clinical Epidemiology and Biostatistics, University of Newcastle, New South Wales, Australia
2Centre for Information-Based Medicine, Hunter Medical Research Institute, Newcastle, New South Wales, Australia
3School of Medicine and Public Health, University of Newcastle, New South Wales, Australia
4School of Nursing and Midwifery, University of Newcastle, New South Wales, Australia
5Centre for Brain and Mental Health Research, University of Newcastle and Hunter Medical Research Institute, New South Wales, Australia
6Department of Neurosciences, Gosford Hospital, Central Coast Area Health, New South Wales, Australia
7Centre for Bioinformatics, Biomarker Discovery and Information-Based Medicine, Hunter Medical Research Institute, Newcastle, New South Wales, Australia
8School of Biomedical Sciences and Pharmacy, University of Newcastle, New South Wales, Australia
9Division of Genetics, Hunter Area Pathology Service, Newcastle, New South Wales, Australia

Introduction: Recent Genome-wide Association Studies (GWAS) have not consistently detected replicable genetic risk factors for ischaemic stroke, potentially due to aetiological heterogeneity of the trait. Common subtyping schemes describe a number of aetiological stroke types and these vary in their degree of familial
aggregation. It is thus plausible that genetic risk factors differ between ischaemic stroke subtypes, hampering gene identification for broad ischaemic stroke.

**Objectives:** To identify and replicate genetic risk variants for ischaemic stroke and its major heritable subtypes via GWAS.

**Methodology:** We performed GWAS in a European-ancestry sample of 1162 ischaemic stroke cases and 1244 population controls from Australia. The causal subtype of ischaemic stroke was assigned using TOAST criteria. Samples were genotyped with the Illumina 610K-Quad array and genotype imputation was performed using HapMap Phase II reference data. Prior to GWAS, we estimated the genetic contribution to ischaemic stroke and three common subtypes by fitting linear mixed models to observed phenotype and SNP genotype data.

**Results:** Evidence for a genetic contribution to haemorrhages (SICH) and independent patients (mRS 0-3) after 90 days between both treatment subgroups. Both subgroups did not differ in median NIHSS on admission (19 vs. 17, p>0.05) and time onset-to-treatment (282±184 vs. 278±150 min., p>0.05). No statistically significant differences were found between both subgroups when comparing time to recanalization after therapy start (108.1±39.9 vs. 76.3±51.9 min.), early complete recanalizations (63.6% vs 54.5%), SICH (0% vs. 0%) and number of independent patients after 90 days (54.5% vs. 27.3%) (p>0.05 in all cases).

**Conclusions:** According to the results of the presented study, the EKOS system and Solitaire stent device represent promising, effective and safe devices for the treatment of AIS due to major cerebral artery occlusion.

Management of acute stroke and stroke rehabilitation

**OP-6**

Safety and efficacy of EKOS system and Solitaire stent device in major cerebral artery occlusion: a randomized pilot study

D Skoloudik, M Kuliha, M Roubec, D Sanak, R Herzig
University Hospital Ostrava, Czech Republic

**Introduction:** Reperfusion is the most beneficial of all therapeutic strategies for acute ischaemic stroke. Endovascular mechanical methods represent a new possibility for early recanalization of an occluded artery.

**Objectives:** The aim of the pilot prospective randomized study was to compare safety and efficacy of two novel recanalization methods in patients with acute ischaemic stroke (AIS) due to major cerebral artery occlusion - intravascular sonothrombolysis using EKOS system and Solitaire stent device.

**Methodology:** Twenty-two patients with AIS due to the acute occlusion of middle cerebral or basilar artery within 8 hours since stroke onset with NIHSS 4 -30 on admission were randomized for treatment using EKOS system (subgroup 1; 8 males, 3 females, mean age 64.6±11.7 years) or Solitaire device (Subgroup 2; 6 males, 5 females, mean age 62.5±15.0 years). Student’s T-test, Wilcoxon signed ranks test and Kruskal-Wallis test were used for the statistical analysis of the differences in early recanalizations, time to recanalization, numbers of symptomatic intracranial haemorrhages (SICH) and independent patients (mRS 0-3) after 90 days between both treatment subgroups.

**Results:** Both subgroups did not differ in median NIHSS on admission (19 vs. 17, p>0.05) and time onset-to-treatment (282±184 vs. 278±150 min., p>0.05). No statistically significant differences were found between both subgroups when comparing time to recanalization after therapy start (108.1±39.9 vs. 76.3±51.9 min.), early complete recanalizations (63.6% vs 54.5%), SICH (0% vs. 0%) and number of independent patients after 90 days (54.5% vs. 27.3%) (p>0.05 in all cases).

**Conclusions:** According to the results of the presented study, the EKOS system and Solitaire stent device represent promising, effective and safe devices for the treatment of AIS due to major cerebral artery occlusion.

**OP-7**

Selecting and excluding stroke patients from thrombolysis in a General Hospital using Emergency Department (ED) physicians and telemedicine support

D Collas, R Henniker-Major, R Watthes
West Hertfordshire Hospitals NHS Trust, United Kingdom

**Objectives:** To understand factors influencing thrombolysis decisions in acute stroke in a general hospital.
**Method:** A prospective database of patients presenting with suspected acute stroke and considered for thrombolysis was reviewed. Reasons for withholding thrombolysis, and who took them, were analysed.

**Results:** Thrombolysis was offered 9 to 5 by a single stroke physician from end 2006, adding ED physicians (2 in 2008, 3 in 2010) and 7 outside stroke physicians in 2011 (providing 24/7 coverage via telemedicine, strictly within licence). A total of 988 patients were considered for thrombolysis; 163 (16.4%) received it and 12 were controls (International Stroke Trial 3). Primary intra-cerebral haemorrhages (86), non-strokes (12) and mimics (58) were clearly not eligible. The commonest reason for non-treatment was late presentation (148, 15%), rapidly resolving/resolved symptoms (150, 15.2%, of whom 5 later deteriorated), uncertain onset (84, inc. 40 wake-up strokes), and 5 fluctuating onset. Clinical factors prevented 61 (6%) being treated appropriately – 24 out of hours, 21 not referred (3 by ED, 3 from cardiology, 2 by junior doctors), 13 delayed diagnosis (10 inpatients, 2 general practitioners), 2 misdiagnoses (1 by telemedicine), 1 telemedicine technical failure. Telemedicine treated 11 and excluded 3, ED staff treated 46. Contraindications applied to 183 (19%), age (35), prior dependency (23), fit at onset (21), established infarct (19), anticoagulation (11), severe stroke (10), recent surgery (8), and prior intracerebral haemorrhage (7) or additional intracranial bleeding (3). Mild strokes (46) were a more subjective contraindication, 18 had no contraindication recorded.

**Conclusion:** Many must be assessed to benefit a few. Some miss out where doctors of suitable experience and expertise are not available. Prompt referral and swift, accurate diagnosis, including of in-patients, is sometimes lacking. Involvement of non-specialists, correctly trained, increases availability but lack of experience, where exclusion criteria are inflexibly applied (age, fit at onset, too mild to treat) may reduce benefit.

**OP-8**

**Persistence of hyperdense middle cerebral artery sign on follow up CT scan after intravenous thrombolysis is associated with poor outcome**

P K Loh, K W P Ng, P R Paliwal, S Liang, V K Sharma  
National University Hospital, Singapore

**Background:** Early identification of reliable predictors of functional outcomes is important for planning interventions and rehabilitation strategies in patients with acute ischaemic stroke (AIS). Hyperdense middle cerebral artery sign (HMCAS) on pre-thrombolysis computerized tomography (CT) of the brain represents presence of thrombus, often associated with severe disability and poor clinical outcome. In thrombolyzed cases, it may disappear (clot dissolution) or persist (persisting clot) on the follow up CT scan. We aimed at evaluating whether persistence of HMCAS on follow up CT predicts final outcome.

**Methods:** Consecutive anterior circulation AIS patients treated with intravenous thrombolysis between 2007 and 2010 were included. HMCAS was assessed by 2 independent readers, blinded to patient data and outcomes. Data were analyzed for early predictors of function outcome.

**Results:** Of the total of 2138 anterior circulation AIS patients admitted during the study period, 226 (%) eligible cases were treated with intravenous thrombolysis. Median age of thrombolyzed patients was 65 years (range 19-92), 63% males and median National Institute of Health Stroke Scale (NIHSS) 16 points (range 4-32). HMCAS was observed on the pre-TPA scan in 109 (%) patients and persisted in 52 (%) of them. Overall, 118 (%) patients achieved good functional outcome (modified Rankin Scale 0-1) at 3 months. Pre-TPA NIHSS score (OR 1.08; 95% CI 1.03-1.14, p=0.002) and HMCAS on follow up CT scan (OR 10.25; 95% CI 4.05-25.99, p<0.0001) were associated with poor outcome at 3 months.

**Conclusion:** Persistence of HMCAS on the follow up CT scan in AIS patients treated with intravenous thrombolysis is an early predictor of poor functional outcome.

**OP-9**

**Usefulness of CT angiography for therapeutic decision making in thrombolyzing difficult to assess patients with basilar artery thrombosis**

K W P Ng, P K Loh, N Venketasubramanian, B P L Chan, V K Sharma  
National University Hospital, Singapore

**Background:** Acute ischaemic stroke (IS) due to basilar artery thrombosis (BAT) causes high mortality and severe disability. Early neurological assessment and timely thrombolysis might improve outcome. BAT is often difficult to diagnose due to wide spectrum of presentation and decreased level of consciousness. Emergency physicians often intubate such patients due to airway compromise, even before arrival of stroke neurologist. We aimed at evaluating role of CT angiography (CTA) of brain and cervical arteries in early diagnosis of acute BAT and facilitating systemic thrombolysis in intubated patients.

**Methods:** Consecutive acute IS patients presenting with history of sudden deterioration in level of
consciousness within 6 hours of symptom-onset and intubated before assessment by neurologist were included. All patients underwent limited fast-track clinical evaluation, brain CT and CTA.

**Results:** Thrombolytic therapy, mainly intravenous tissue plasminogen activator (IV-TPA), was administered to 161 (8.4%) of 1917 acute IS patients admitted during the study period. Acute BAT contributed 10.9% (208 cases). 5 cases (3 males, mean age 72 years) of acute BAT and airway compromise were intubated early, sedated and paralyzed before Neurologists’ assessment. CTA showed BAT in all. IV-TPA was initiated at 236±40 minutes in 4 patients and 1 received intra-arterial TPA, initiated at 13 hours. There was no intracranial haemorrhage and mean length of hospital stay was 11.8 days. Despite severe strokes at presentation, good functional recovery at 3 months (modified Rankin scale- mRS 1) occurred in 2 patients; mRS 4 in one and 2 died (including the patient treated intra-arterially). 4 additional cases who met the inclusion criteria but had normal CTA were not thrombolysed. None of them showed new brain infarcts on subsequent neuro-imaging.

**Conclusion:** In acute BAT patients, intubated before Neurologists’ assessment, CT angiography is helpful in confirming the diagnosis and facilitating systemic thrombolysis.

**OP-10**

Trends in characteristics, aetiology and outcome of ischaemic stroke in a Chinese hospital-based stroke study

B Wu, S Lin, W Tao, Z Hao, D Wang

Stroke Clinical Research Unit, Department of Neurology, West China Hospital, Sichuan University, China

**Introduction:** There is scant information on trends in characteristics, aetiology, and outcome of ischaemic stroke in China.

**Objective:** Using the Chengdu Stroke Registry, we aimed to determine trends in characteristics, aetiology, functional outcome and case-fatality in hospitalized ischaemic stroke patients.

**Methods:** For this study, first-ever ischaemic stroke patients who were admitted within 1 month of stroke onset during the period of March, 2002 through December, 2008, were included. Data on ischaemic stroke patients were collected including demographics, risk factors, 3-month, 6-month and 1-year death and disability rates. Temporal trends in ischaemic stroke patient characteristics for the periods 2002-2005 and 2006-2008 were assessed.

**Results:** Of the 2683 patients included in this study, 1427 patients were for the 2002-2005 and 1256 for 2006-2008. Compared to patients in 2002-2005, patients in 2006-2008 were younger (63.27 vs. 64.49, p=0.021), more frequently male (60.5% vs. 56.6%, p=0.041), had a lower NIHSS score on admission (median, 4 vs. 5, p=0.011), consumed more alcohol (23% vs. 17.4%, p<0.001) and had higher rates of current smoking (33.2% vs. 24.9%, p<0.001). There were no differences in rates of hypertension, diabetes mellitus, hyperlipidaemia, coronary heart disease, myocardial infarction, valvular disease and previous TIA between the two groups. The ischaemic stroke aetiology of patients in 2006-2008 had more large-artery atherosclerosis (10.5% vs. 4.6%, p<0.001) and less undetermined aetiology (31.2% vs. 37%, p=0.002) than patients in 2002-2005. Moreover, patients in 2006-2008 had a lower proportion of disability at 3-month, 6-month and 1-year follow ups (25%, 21.9% and 18.2% vs. 36.2%, 29.6% and 24.1% respectively, p<0.001), but no differences in hospitalization, 3-month, 6-month and 1-year case-fatality rates.

**Conclusions:** In recent years, with the improvement in stroke management and rehabilitation as well as the developed application of advanced diagnostic methods, ischaemic stroke patients have a better functional outcome and aetiology can be classified more precisely in China.

**OP-11**

Recurrent strokes in Sri Lankan patients: data from the Ragama Stroke Registry

U K Ranawaka, M A F Alexander, A T Gammulla, V N R M Fonseka, A M A Amensi, A Pathmeswaran, A R Wickramasinghe

Faculty of Medicine, University of Kelaniya, Sri Lanka

**Introduction:** Stroke characteristics are different in those with recurrent strokes, but little data is available from developing countries.

**Objective:** We aimed to describe the clinical characteristics, risk factors, and outcome in Sri Lankan patients with recurrent strokes admitted to a tertiary care setting.

**Methods:** We studied all patients with acute stroke admitted to Colombo North Teaching Hospital.
Patients with stroke, aged >18 years, few studies have described patients who had died after discharge. Stroke subtype translated scales. A verbal autopsy was carried out for vascular events using standardized, pretested and cognitive and psychological outcomes and recurrent surrogates were interviewed regarding functional, and risk factors data was collected from the medical records.

Results: We studied 547 patients – 59.4% males; mean age (SD) 64 (12.8) years. Recurrent strokes were seen in 13.9%, and were commoner among older patients (mean age - recurrent 66.5 years vs. first 63.6 years; p=0.024), hypertension (p=0.001), diabetes (p=0.030) and hyperlipidaemia (p=0.037) were commoner in those with recurrent stroke, and they were more likely to be on prior antiplatelet therapy (30.3% vs. 10.4%; p<0.001). There was no difference in pathological subtype (ischaemic – 87.5% vs. 87.3%, haemorrhagic – 12.5% vs. 12.7%; p=0.566). Those with recurrent ischaemic strokes were more likely to have total anterior circulation syndromes (42.9% vs 14.4%; p<0.001), and less likely to have lacunar syndromes (28.6% vs 59.7%; p<0.001). No differences were noted in presentation delays, duration of hospital stay and in-hospital treatment. On bivariate analysis, recurrent stroke was associated with higher stroke severity on admission (mean NIHSS – 14.2 vs 9.3; p<0.001), and poor functional outcome at discharge (modified Barthel index – p=0.003; modified Rankin scale – p=0.012). However, recurrent stroke was not an independent predictor of poor outcome after adjusting for stroke severity on logistic regression.

Conclusion: Recurrent strokes were associated with older age, different clinical subtypes, different risk factor profiles and more severe strokes, but were not associated with worse functional outcome after adjusting for stroke severity.

OP-12

Functional, cognitive and psychological outcomes and recurrent vascular events in Pakistani stroke survivors

M Khan, B Ahmed, M Ahmed, M Najeeb, A Kamal
The Aga Khan University Hospital, Pakistan

Background: There is little or no direct data describing the outcomes and recurrent vascular morbidity and mortality of stroke survivors from low and middle income countries like Pakistan.

Objective: To determine the functional, cognitive and psychological outcomes and the occurrence of recurrent vascular events in Pakistani stroke survivors.

Methods: Patients with stroke, aged >18 years, discharged alive from a tertiary care centre were contacted via telephone. Patients or their legal surrogates were interviewed regarding functional, cognitive and psychological outcomes and recurrent vascular events using standardized, pretested and translated scales. A verbal autopsy was carried out for patients who had died after discharge. Stroke subtype

Introduction: Few studies have described characteristics and consequences of Chinese ICH patients.

Objectives: We aim to profile the nature and in-hospital outcome of ICH in western China.

Methods: A multi-centre, hospital-based ICH registry study prospectively registered ICH cases of 8 hospitals in western China. Data on baseline characteristics, management and outcome at discharge was collected. Factors influencing in-hospital outcomes were analyzed by multivariate analysis.

Results: A total of 1822 ICH patients (average age 59.76 ±12.50 years) were included with men (62.6%) significantly outnumbering women (P<0.001). Peasant farmer (35.5%) was the most common occupation type seen among the patients. ICH occurred in basal ganglia (56.6%) most frequently, followed by lobar area (16%), thalamus (15.7%), cerebellum (6.1%), brainstem (5.1%), and ventricles (3.1%). Ventricular extension was seen...
in 31.8% of patients. 39.8% of ICH presented with a low Glasgow Coma Scale (GCS) score (3~8). Totally 179 patients (9.8%) died in hospital (median stay 10.0 days, IQR4.0~23.0). The overall rate of surgery was 38.0%. Risk factors of in-hospital death were male gender [OR=1.965(1.184~3.260)], low GCS score [7.712 (4.104~14.491)], hypertensive history [2.020 (1.483~2.749)], intraventricular haemorrhage [4.231 (1.518~11.790)], and non-surgical treatment [1.763 (1.085~2.866)]. Age [1.019(1.006~1.033)], low GCS score [2.630(2.153~3.212)], brainstem haemorrhage [2.553 (1.221~5.339)] and non-surgical treatment [0.415 (0.282~0.610)] were independently associated with death/ dependency at discharge.

**Conclusion:** ICH in western China was characterized by early age of onset, male predominance and peasant farming, while a large proportion had severe presentation. Risk factors of in-hospital death were male gender, low GCS score, hypertensive history and non-surgical treatment. Surgery brought down in-hospital death but increased risk of death/ dependency at discharge.

**OP-15**

**Prevalence of patent foramen ovale in young onset cryptogenic stroke in Sri Lanka**

**S C Somaratna, S A C U Gunawardhana, A Arasalingam, P S Gunaratne**

*Unit 2, Institute of Neurology, National Hospital of Sri Lanka, Colombo, Sri Lanka*

**Introduction:** Studies to date have shown an association between the presence of patent foramen ovale and cryptogenic stroke (CS) in patients younger than 45 years of age. However, the data in Sri Lankan patients related to this context is limited. Hence, the objectives were to assess the prevalence of PFO in CS patients and to compare that of patients with stroke of known cause.

**Method:** A total of 60 patients below 45 years of age admitted to Stroke Unit at National Hospital of Sri Lanka from 2009 January to 2011 June with sequelae of ischaemic stroke were prospectively evaluated. Out of total patients with ischaemic stroke there were 24 patients with cryptogenic stroke (no cause was found after extensive investigations - group I) and that subgroup was compared with 36 patients with stroke of known cause (group II). We investigated the prevalence of patent foramen ovale in all patients, using transoesophageal echocardiography (TOE).

**Results:** The mean age of the study group was 27.5 years, compared to 33.7 years for the control group. Group I comprised 53% men compared to 57% in group II. Clinical classification revealed that 61.2% of patients in the group I had lacunar syndrome while 50.3% in group II had partial anterior circulation syndrome. The prevalence of patent foramen ovale was 8.4% among patients with cryptogenic stroke whereas none was found in those with stroke of known cause.

**Conclusions:** The presence of patent foramen ovale appears to be less significant in young patients with cryptogenic stroke in comparison to similar studies done in other countries. A repeat study with larger population would further strengthen this statement.
PP-1

An association study of matrix metalloproteinase 9 gene's single nucleotide polymorphisms or haplotypes with the risk or outcome of intracerebral haemorrhage

J Yang, S Lin, B Wu, C Zhang, M Liu
Department of Neurology, West China Hospital, Sichuan University, Chengdu, China

Introduction: As the key candidate gene of the risk and outcome of intracerebral haemorrhage (ICH), matrix metalloproteinase 9 (MMP9) gene's single nucleotide polymorphisms (SNPs) or haplotypes may influence the risk or outcome of ICH.

Objective: To investigate the relationship between SNPs or haplotypes of MMP9 gene and the risk or outcome of ICH.

Methodology: Mass-spectrometer was used to determine SNPs genotyping. The patients' death and disability were followed prospectively. Unphased software was employed to construct haplotypes and analyze the association between SNPs or haplotypes of MMP9 gene and the risk or outcomes of ICH.

Results: We recruited 181 patients with ICH and 197 patients with hypertension in Chinese Han Population. There was no relationship between the MPP9 gene's SNPs or haplotypes and the risk of ICH (p>0.05). The haplotypes of TGG (rs3918254-rs3787268-rs175777) (p<0.05), and TG (rs3918254-rs3787268) (p>0.05) were both associated with a reduced risk of death and disability in patients at 3 months. The same haplotypes of TGG (p<0.05) and TG (p<0.05) were both associated with a reduced risk of death and disability in patients at 6 months, too.

Conclusion: There was no relationship between the MPP9 gene's SNPs or haplotypes and the risk of ICH. The haplotypes of TGG (rs3918254-rs3787268-rs175777) and TG (rs3918254-rs3787268) were both associated with a reduced risk of death and disability in ICH patients.

PP-2

Correlation of carotid intima-media thickness with blood pressure, a cross sectional study

S Harris
Neurology Department, Faculty of Medicine University of Indonesia, Indonesia

Introduction: Many factors are believed to be related to intima-media thickness (IMT), which is considered to occur in the early phase of the atherosclerotic process. Most studies have demonstrated that intima-media thickness (IMT) is thicker in large vessels such as the carotid in patients with atherosclerotic risk factors, such as age, hypertension, hypercholesterolemia, smoking and diabetes.

Objectives: In this study, we examined whether intima-media thickness of the common carotid artery is related to hypertension.

Methodology: The intima and media thickness of the common carotid artery was measured with high-resolution B-mode ultrasonography in 295 subjects (92 women and 203 men). The age ranged from 12 to 86. The subjects were divided into 3 groups depending on age. 173 were hypertensive and 122 were normotensive.

Results: The common carotid IMT (CC-IMT) was thicker in hypertensive than in normotensive subjects (p<0.0001) and also thicker in the older age group (p<0.0001).

Conclusion: We conclude that hypertension and age were correlated with intima-media thickness.

PP-3

Association of plasma homocysteine level and the course of ischaemic stroke in Indonesian people

S Harris
Neurology Department, Faculty of Medicine, University of Indonesia, Indonesia

Introduction: Increased level of homocysteine (Hcy) in blood seems to be an independent risk factor for cerebrovascular disease including ischaemic stroke. This is possibly caused by endothelial dysfunction.

Objectives: The goal of this study was to find out whether there was an association between Hcy level and the prevalence of ischaemic stroke in Indonesian people.

Methodology: This was a cross-sectional study. 110 patients were recruited. They were grouped as stroke and non-stroke patients. The plasma homocysteine level was measured in the 66 stroke patients and the 44 controls from the neurology outpatient unit. The subjects were also assessed for the presence of hypertension, diabetes mellitus and dyslipidaemia.
Results: There were 110 patients. Age ranged from 34 to 88 (59.23 ± 12.08) years. In the stroke group the plasma homocysteine level was elevated in 46 out of 66 patients with a mean value of 12.09 ± 3.86 mmol/l while in the non-stroke group it was elevated in only 6 out of 44 patients with a mean value of 8.03 ± 2.28 (P<0.001).

Conclusion: Increased level of plasma homocysteine is strongly associated with prevalence of stroke.

PP-4

Post-traumatic infarcts leading to poor outcome after traumatic brain injury

N Singla
Postgraduate Institute of Medical Education and Research, Chandigarh, India

Traumatic brain injury can produce infarcts due to various reasons, such as cerebral herniation, hypoxia/hypotension, direct vascular injury, skull base fracture and vasospasm. One hundred and two patients with post-traumatic infaracts were studied. Most of the patients were in a poor neurological status at presentation - 77 (GCS 3-8), 18 (GCS 9-12) and 7 (GCS 13-15). Single vascular territory infarct was seen in 38 patients, watershed infarcts in 29, deep perforator area infarcts in 13 and hemispheric infarcts in 6. At one year follow up, 57 had died, 33 had recovered to GOS of 2-3 while only 12 had a good recovery (GOS 4-5).

PP-5

Posttraumatic stress disorder and transcranial doppler sonography

M Dikanovic
General Hospital Slavonski Brod, Croatia

Transcranial Doppler (TCD) sonography was used to examine mean blood flow velocity (MBFV) in 50 patients suffering from post-traumatic stress disorder (PTSD) before and six months after successful psychiatric treatment. Doppler sonography of the circle of Willis blood vessels and vertebrobasilar flow was also performed in a control group of healthy subjects. The subjects from both groups were aged 20 to 43 years and were free from other diseases. Vasospasm of the circle of Willis blood vessels was initially detected in 62% of PTSD patients. This decreased to 22% after treatment. In the control group, vasospasm of the circle of Willis blood vessels was found in 8% of subjects. TCD examination of the vertebrobasilar system blood vessels showed no statistically significant difference in MBFV between control subjects and PTSD patients, irrespective of treatment. Study results confirmed the value of TCD in detecting vasospasm in the circle of Willis vessels in PTSD patients, pointing to the role of TCD in the diagnosis of PTSD. The study pointed to the value of TCD in the evaluation of therapeutic success, because the proportion of PTSD patients with vasospasm of the circle of Willis blood vessels was lower six months after psychiatric treatment with this finding being statistically significant.

PP-6

Anaemia at admission is an independent predictor of death in patients with acute ischaemic stroke

M Liu, Z Hao, B Wu, D Wang, S Lin, W Tao
Stroke Clinical Research Unit, Department of Neurology, West China Hospital, Sichuan University, China

Objectives: To investigate factors that influence anaemia on admission and association between anaemia and clinical outcomes in acute ischaemic stroke.

Methodology: We prospectively registered consecutive Chinese patients with acute ischaemic stroke within 24 hours of symptom onset. The anaemia (defined as a blood haemoglobin level of <120g/L for women and <130g/L for men) was analyzed by using multivariate logistical regression to evaluate the influencing factors for anaemia and to determine association between anaemia and outcomes. The main outcomes were death, death/disability (disability defined as mRS>2) at 12 months after stroke.

Results: Of the 1176 cases, 351 cases had anaemia at admission, which accounted for 29.8%. The distribution of haemoglobin on admission was similar to normal distribution and the mean was 131.54±21.07g/L. The independent influencing factors of anaemia were age (OR=1.02, 95% CI: 1.01-1.03), history of hemorrhagic stroke (OR=3.34, 95% CI: 1.17-9.56), alcohol consumption (OR=0.59, 95% CI: 0.38-0.92), estimated glomerular filtration rate <60ml/min/1.73m2 at admission (OR=1.34, 95% CI: 1.00-1.80). After adjustment for age, NIHSS, vascular risk factors and renal function, anaemia at admission was an independent prognostic factor for death at discharge and twelfth month (OR=1.66, 95% CI: 1.08-2.56; OR=1.56, 95% CI: 1.05-2.31), but not for death/disability at twelfth month (OR=1.01, 95% CI: 0.71-1.44).

Conclusions: Our study indicated that more than 1/4 of acute ischaemic stroke patients had anaemia. Anaemia is an independent predictor of death in acute ischaemic stroke patients.
**PP-7**

Acute ischaemic stroke caused by an acute internal carotid artery occlusion: factors predicting better clinical outcome in patients undergoing emergent carotid endarterectomy

R Herzig¹, D Skoloudík¹², M Kral¹, D Sanák¹, O Skoda¹

¹Comprehensive Stroke Center, Department of Neurology, Palacký University and University Hospital, Olomouc, Czech Republic
²Department of Neurology, University Hospital and University of Ostrava, Czech Republic
³Department of Neurology, Hospital Pelhrimov, Czech Republic

**Introduction:** Acute ischaemic stroke (AIS) caused by an acute internal carotid artery occlusion (ICAo) is often associated with a severe and persistent neurological deficits and a high mortality rate. Intravenous thrombolysis (IVT) is the only standard treatment. As reported previously (Neurology 2008;70(Suppl 1):A23), an experimental use of an emergent carotid endarterectomy (CEA) may be associated with a more favorable clinical outcome when compared to IVT.

**Objective:** The aim was to assess the existence of factors predicting better clinical outcome in patients with AIS caused by an acute ICAo, undergoing emergent CEA.

**Methods:** In a retrospective, hospital-based, three-center study, the set consisted of 58 patients (43 males; age 39-80, mean 64.1±9.6 years). Clinical assessment was quantified by admission NIHSS score and 1-year modified Rankin scale. Relationship between the 1-year clinical outcome and the following factors were assessed: patient age, sex, ICAo side, patency/occlusion of intracranial arteries, NIHSS value before surgery, CEA efficacy, time from onset of symptoms to the ICA recanalization. Spearman correlation analysis, Mann-Whitney U-test, chi-square test, Fisher exact test were applied when assessing statistical significance.

**Results:** Good 1-year clinical outcome (mRS 0-2) was achieved in 29 (50.0%) patients (subgroup 1) and poor clinical outcome (mRS>2) in 29 (50.0%) patients (subgroup 2). The following statistically significant differences were found between the subgroup 1 and subgroup 2 patients: age (median 62.0 versus 70.0 years; p=0.009), NIHSS value before surgery (median 6.0 versus 14.0; p=0.0003). Patients with occlusion of intracranial arteries had a significantly higher 1-year mRS value than those without occlusion (median 6.0 versus 2.0; p=0.01).

**Conclusions:** In this three-center retrospective comparison, the younger age, milder neurological deficit before surgery and patency of intracranial arteries were identified as factors predicting better 1-year clinical outcome in AIS patients caused by acute ICAo undergoing emergent CEA.

---

**PP-8**

Validation study of Siriraj stroke score in Southern Philippines

Ty A F Talamera, D S Franco

Saint Paul’s Hospital Iloilo, Philippines

**Introduction:** Stroke is a major cause of morbidity and mortality in the Philippines. CT scan is essential in identification of stroke pathology and subtypes. Distance to CT facility, scarcity of CT machines and high financial cost make it unavailable to most patients. Doctors are thus left to rely on history and physical findings to clinically diagnose stroke. The Siriraj Stroke Score (SSS) is one of the most widely used bedside scoring systems worldwide to clinically diagnose stroke. It has been validated in different populations but not among Filipinos.

**Objective:** To validate the predictive accuracy of SSS among Filipino patients admitted in Saint Paul’s Hospital (SPH), Iloilo City, Southern Philippines.

**Methodology:** A prospective study was performed on all patients presenting with stroke at SPH between March 2009 to March 2010 who were > 18 years-old and underwent CT-scan within 48 hours of admission. Variables for SSS were accomplished and its clinical accuracy was calculated.

**Results:** A total of 298 participants were enrolled in the study. There were more females (51.34%) compared to males (48.66), with a male-to-female sex ratio of 1:1.06. There were more ischaemic strokes (67.45%) compared to haemorrhagic strokes (32.55%). SSS achieved an overall predictive accuracy of 79%. The relationship between SSS and brain CT achieved statistical significance (p-value <0.01)

**Conclusion:** Cranial CT-scan remains the cornerstone in the diagnosis of stroke, but SSS can be utilized as a helpful bedside clinical tool. In a setting such as Philippines where geography, distance, financial capability and limited availability of CT-scan machines present a constant challenge to clinicians, the use of SSS is encouraged especially in situations where prompt stroke management is needed but neuroimaging is not available.

---

**PP-9**

Contralateral arm and leg restlessness in a patient with internal capsule infarction

Y Do, M J Lee

Department of Neurology, School of Medicine, Catholic University of Daegu, Korea

**Introduction:** Restless legs syndrome (RLS) is a sleep
disorder, characterized by uncomfortable and unpleasant sensations primarily in the legs.

Case: A 62-year-old female presented with acute dysarthria and left hemiparesis for 2 days. She had hypertension, diabetes, and end-stage renal disease. Brain MRI showed an acute infarction in the posterior limb of the right internal capsule. 4 days after the stroke, she complained of sleep disturbance due to tingling and crawling sensation and restlessness in her left arm and leg. She had never experienced these before. Blood tests were normal apart from azotaemia. Nerve conduction study and somatosensory evoked potentials were normal. The abnormal sensation and restlessness disappeared 5 days after the use of pramipexole and did not recur after discontinuation of pramipexole.

Conclusion: We report a case of arm and leg restlessness in patient with internal capsule infarction which may be a clue to a better understanding of the pathophysiology of RLS.

PP-10

An uncommon yet treatable symptom following stroke

P Boovalingam, G Pope
John Radcliffe Hospital NHS Trust, Oxford, United Kingdom

Eye lid apraxia is an extremely rare condition and has been previously reported in deep brain stimulation, hemispheric stroke, motor neurone disease.

Case Report: An 83 year old Caucasian lady with history of atrial fibrillation on warfarin was referred to the stroke team after being found unresponsive in the surgical ward, admitted for the evaluation of suspected bowel malignancy. On arrival she had a reduced level of consciousness level with a GCS of 14. Her confusion improved after couple of hours. She also had right upper motor neurone seventh nerve palsy, mild right arm and leg weakness. Urgent MRI brain and MRA showed bilateral medial thalamic infarcts with no evidence of metastasis. The vertebral artery was patent. The patient’s motor weakness resolved within 48 hours after aspirin. However, patient continued to have inability to voluntarily open her eyes (eyelid apraxia) which complicated her rehabilitation. Patient was referred to the ophthalmology unit for “crutch” glasses which assisted her in keeping her eyes open, thus improving her vision and mobility. Subsequently she was discharged to a community hospitals for further rehabilitation.

Conclusion: 1. Eyelid apraxia is uncommon but can be the only symptom following bilateral medial thalamic infarcts. 2. Recognition of this important, disabling yet treatable condition early is critical as it impairs the rehabilitation and functional recovery in stroke patients.

PP-11

The association between post stroke depression and self-concept

S A Halley1, T G Phan2, G Couchman3, A G Wood4
1School of Psychology and Psychiatry, Department of Medicine, Monash University, Melbourne, Australia
2Department of Neurosciences, Monash Medical Centre, Melbourne, Australia
3Department of Medicine, Southern Clinical School, Monash University, Melbourne, Australia
4School of Psychology, University of Birmingham, Edgbaston, United Kingdom

Objectives: The purpose of this study was to explore changes in self-concept in the early stage poststroke and to investigate the relationship between self-concept and depression.

Methodology: Participants comprised 60 first-episode, stroke patients (mean=63 years) who were assessed within 12 days (Time 1) and at one month (Time 2) poststroke. Self-concept was measured using the validated Tennessee Self-Concept Scale (2nd edition, TSCS-II) and the Head Injury Semantic Differential (3rd edition; HISD-III). The HISD-III also measured prestroke self-concept, retrospectively. Those with a cut-off score of 11 on the Hospital Anxiety and Depression Scale at Time 2 were further assessed using the Mini International Neuropsychiatric Interview (DSM-IV criteria). A paired-samples t-test was used to analyse self-concept changes from prestroke to poststroke. Logistic regression was used to predict the influence of self-concept on depression.

Results: Sixteen patients (27%) experienced major (n=9) or minor (n=7) depression. HISD-III ratings were significantly decreased poststroke (mean=85±19, p<0.05) compared to retrospective prestroke ratings (mean=101±17). At Time 1, the depressed and non-depressed group displayed a mean TSCS-II rating of 73±7 and 80±9 respectively. At Time 2, HISD-III mean change scores were -23±25 for the depressed and -6±15 for the non-depressed group. Regression analyses indicated that TSCS-II ratings (Time 1) and HISD-III change scores (Time 2) predicted depression at Time 2, controlling for gender and a history of depression (TSCS-II OR 0.90, p<0.05; HISD-III change OR 0.41, p<0.05).

Conclusions & recommendations: These preliminary findings suggest that self-concept declines within the acute stage of stroke and a more negative self-concept acutely is predictive of subsequent poststroke depression. Further investigation of the relationship between self-concept and poststroke depression is warranted.
We present a retrospective study following acute stroke there is an incidence of radiological vasospasm in either group with respect to the overall outcome was similar in both groups.

**Objective:** We intended to study the differences in presentation, radiology and outcome in PM and NPM angionegative SAH in northern India. Few studies are available relating these two entities (1).

**Methodology:** We present a retrospective study involving 87 patients (21 belonging to PM and 66 to NPM angionegative SAH respectively) in our hospital within the last 4 years. The clinical data of all suitable patients were collected and compared with respect to the clinical course, radiology, neurological deficits and outcome.

**Results:** The mean age of presentation in both the groups was around 52 years. The male to female sex ratio in all angionegative SAH was 1.8. This minor male sex predilection was also observed in both PM and NPM angionegative SAH. There were no differences observed in the duration following the ictus and the overall hospital stay in both groups. The patients with PM angionegative SAH had slightly higher incidence of hemiparesis (9.5%); whereas those with NPM angionegative SAH had more seizures (9.1%) and episodes of unconsciousness (39.1%). Approximately 71.4% of patients with PM angionegative SAH presented with Hunt and Hess grade ‘1’ in contrast to 56.1% in the other group. CT scan based Fischer Grade ‘4’ was seen in 12.1% of patients with NPM angionegative SAH as compared to 4.8% in the other group. There was no statistically significant difference observed in the radiological vasospasm in either group with respect to the overall incidence of 6.9% in all patients with angionegative SAH. The modified Rankin Scale was used in assessing the outcome and 95.2% of patients with PM angionegative SAH had grade ‘0’ which is also similar in NPM angionegative SAH (84.8%).

**Conclusions:** Incidence of angionegative SAH is common amongst men in their fifties, as found in this study. The patients with perimesencephalic (PM) angionegative SAH had a better H & H grade and Fischer CT grade. However, they had more frequent hemiparesis. Those with NPM angionegative SAH had more episodes of seizures and of unconsciousness, whereas the incidence of radiological vasospasm and the overall outcome was similar in both groups.

**Introduction:** Rupture of an intracranial aneurysm is the commonest cause of subarachnoid haemorrhage (SAH) in adults. However, in approximately 15-20% of the cases the cause remains unidentified by cranial angiography. This is known as angionegative SAH. Angionegative SAH are classified into two subgroups namely perimesencephalic (PM) angionegative SAH and non-perimesencephalic (NPM) angionegative SAH; depending on the location of the major bleed in the computerized tomography (CT) scan.

**Methods:** Ninety two patients, who presented within 48 hours of the onset of acute stroke to University Unit of Colombo South Teaching Hospital from the 1st of April to the 30th of June 2011, were studied. The blood pressure was measured and recorded by a single observer using a validated, automated blood pressure monitor on admission and 2 hours later. All patients were subjected to non contrast computerised tomography (CT) scanning of the brain.

**Results:** The age of patients ranged from 32 to 89 years (mean 65 years). Of the strokes, 80.4% were infarctions and 19.6% of were due to haemorrhage. The mean blood pressure (MBP) on admission of normotensive patients was 151.5/91mmHg (SD 29/15) and the MBP 2 hours following admission was 147/88mmHg (SD 25/13). In the previously hypertensive patients the MBP on admission was 161/95 mmHg (SD 36/20) and the MBP 2 hours after admission was 155/92 mmHg (SD 32/15). There was a reduction in mean blood pressure seen 2 hours following admission regardless of whether the stroke was due to an infarction or haemorrhage; or whether the patient was previously diagnosed to be hypertensive or not, but a statistically significant reduction was seen only in the SBP in the hypertensive patients. However SBP did not decrease in 16 and increased in 24 and the DBP did not change in 30 and increased in 26 patients.

**Conclusion:** Following acute stroke there is an observed significant reduction in both systolic and diastolic blood pressures from admission to 2 hours following admission in the majority of patients.
PP-14

Intracranial steal phenomenon in patients with severe steno-occlusive disease of intracranial carotid or middle cerebral artery

K W P Ng, P K Loh, H L Teoh, A K Sinha, V K Sharma
National University Hospital, Singapore

Background: Intracranial stenosis is associated with stroke recurrence. In severe stenosis, perfusion is maintained by collateral pathways and cerebral autoregulation (CA). CA may be impaired due to inadequate cerebral vasodilatory reserve (CVR) and intracranial steal phenomenon, so called ‘reversed-Robin Hood syndrome (RRHS)’. Identification of patients with inadequate CVR and RRHS may help in selecting high-risk patients.

Methods: We evaluated patients with symptomatic and severe stenosis of intracranial carotid (ICA) and middle cerebral artery (MCA), defined according to validated transcranial Doppler (TCD) criteria. CVR was evaluated with TCD and breath-holding index (BHI) <0.69 determined inadequate CVR. RRHS was detected as a transient velocity reduction in the affected artery when flow increased in the reference artery. Patients with RRH were further evaluated with acetazolamide-challenged HMPAO-SPECT.

Results: 112 patients (79 males, mean age 57yrs; range 23-79yrs) with severe intracranial stenosis fulfilled our TCD criteria of inadequate CVR. 35 (31%) patients demonstrated RRHS with a median steal magnitude of 17% (inter-quartile range, IQR 10). HMPAO-SPECT demonstrated a perfusion deficit (median 8%; IQR 13%) in 33 out of these 35 cases (sensitivity 78%, specificity 96% with positive predictive value 96%). A strong relationship between RRH on TCD and SPECT was noted on ROC curve analysis (area under curve 0.93; 95% confidence interval 0.88-0.98;p<0.00001). Linear relationship was noted between TCD steal magnitude and SPECT (Pearson correlation coefficient, r=0.643;p<0.0001). Patients with RRHS were at a higher risk of developing recurrent cerebral ischaemia (p=0.04; RR 1.7, 95%CI 1.2-3.6).


PP-15

Endocrine dysfunction following acute aneurysmal subarachnoid haemorrhage: a prospective study based on 100 cases

A K Jaiswal, S Yadav, R N Sahu, S Behari, A K Mahapatra
Sanjay Gandhi Postgraduate Institute of Medical Sciences, Lucknow, India

Background: Evidence that aneurysmal subarachnoid haemorrhage (SAH) is associated with neuroendocrine dysfunction comes mainly from case reports or small series of patients.

Objective: The aim of this study was to investigate the incidence and pattern of neuroendocrine dysfunction in cases of acute aneurysmal SAH.

Material and methods: This prospective study was done on the cases of acute SAH treated in our institute. Their detailed clinical and endocrine evaluation was performed.

Results: Total 100 cases (38 males, 62 females; age range from 17-76 years; mean age 43.6 years) of acute SAH were studied. The aneurysms were located in the anterior circulation (n=95) and the posterior circulation (n=5). The commonest hormone deficiency was of growth hormone (n=67) followed by gonadotrophin (n=50), corticotrophin (n=49) and thyrotrophin hormones (n=35). Hyperprolactinemia was noted in 10 cases. One pituitary hormone axis deficiency was noted in 26 cases while 67 cases had two or more pituitary hormone axes deficiencies. A total of 93 cases had hormonal deficiency in one or more pituitary hormone axes and 7 cases had no hormonal deficiencies.

Conclusions: Endocrine dysfunction occurs in 93% cases of acute SAH and multiple pituitary hormone axes deficiency occurs in 67% cases. It is suggested that hormonal evaluation should be considered as a part of management of acute SAH.

PP-16

A 64 year old woman with a typical left middle cerebral artery territory stroke?

T Coughlan, T Wijeratne, S Guy, G Lane
Western Health, Melbourne, Australia

Objective: To describe a patient with progressive multifocal leukoencephalopathy (PML) who presented to the stroke service as a possible left middle cerebral artery territory stroke.

Methodology: Case study of a patient presenting to the
Western Hospital in Melbourne, Australia including literature review.

Case study: A 64 year old right handed woman developed acute onset expressive dysphasia. Her past history included chronic lymphocytic leukemia for which she had received Rituximab 9 months prior to presentation. Clinical examination confirmed expressive dysphasia with paraphasic errors, abnormalities in repetition and additional right homonymous hemianopia. The patient was diagnosed as having a stroke mimic and thrombolysis was not offered. Cerebral imaging raised the possibility of PML and CSF studies confirmed the presence of JC virus. The patient did not respond to treatment with cidofovir, mefloquine and mirtazepine. Corticosteroids were subsequently given to treat possible immune reconstitution inflammatory syndrome, however she developed progressive neurological deficits and died 34 days after presentation.

Discussion and conclusions: PML can present as a stroke like syndrome in a non HIV infected patient population and has been associated with Rituximab therapy. Despite antiviral therapy outcomes are often poor. The case we describe presented both diagnostic and management challenges; in a patient with atypical presentation for stroke alternative diagnoses must be considered.

PP-17

Baseline characteristics, one-year outcome and medication of patients with transient ischemic attack in China

W Du, Y Wang, G Liu, X Zhao, C Wang
Beijing Tiantan Hospital, China

Background and objective: The characteristics, outcome and medical therapy of patients with transient ischemic attack (TIA) in China were little known. We sought to study these data in the Chinese National Stroke Registry (CNSR).

Methods: From September 2007 to August 2008, 22,490 patients with stroke/TIA were entered into CNSR, the nationwide stroke/TIA registry which included 132 urban hospitals. Information about baseline characteristics, one-year outcome and medications of patients with TIA was collected for analysis.

Results: In all, 1,359 patients with TIA (6.3%) were studied. Among them, the mean age was 63.52±12.02 years, 61% were male. The most prevalent past history was hypertension (58.13%). At one year, all vascular event rate was 25.44% (stroke 16.76%, death 4.91%, the others 4.41). Treatment compliance was lowest in anticoagulants. Adherence to statin treatment decreased most rapidly.

Conclusion: Fewer patients with TIA in China were admitted in hospital than in Canada. Adherence to treatment needs to be improved.

PP-18

Young stroke

M Pathirage, C Senadheera, L Van Raay, S Cellesteno, TWijeratne
Department of Neurology, Western Hospital, Melbourne, Australia

Introduction: Stroke in young adults (18-50 years old) has a devastating impact including life-long loss of productivity.

Objectives: To study young stroke (YS) incidence, aetiological factors and the classification in a metropolitan hospital, Melbourne, Australia.

Methodology: We conducted a retrospective analysis of 190 YS patients (18-50 years) who were admitted to the Western Hospital (WH) between January 2005 and December 2010. The distribution of stroke subtype using TOAST classification was recorded together with the results of radiological investigation, haematology and biochemical risk markers and associated stroke risk factors.

Results: There were 105 males and 85 females (M: F - 1.2:1). The average age was 40.4 years (minimum 21, maximum 49). The majority (60%) of the YS presented at the age of 30 to 45. There were 7.9% (15) presented between 20-29 and 26.8% (51) between 46 - 49 years. Infarctions were more common (104) than the haemorrhages (81). Among the haemorrhages sub arachnoid haemorrhage (SAH) was the commonest (43/ 53.1%). There were 34 intracranial haemorrhages (ICH (41.9%), 14 subdural haemorrhages (SDH (17.3%), 9 intra-ventricular haemorrhages and 1 extradural haemorrhage. Of 71 patients studied for the cardiac sources of emboli only 6 had a potential cardiac source of embolism detected by echo. Furthermore, 29.8% of infarcts were associated with vertebral or carotid artery dissection. Dyslipidaemia was present in 30% of patients with cerebral infarction.

Conclusion: An extensive evaluation for the cause of stroke is necessary in YS. Haemorrhagic stroke in the young represents a higher proportion of stroke than in older patients. There is a need for further, multicentre studies in YS utilising standardized protocols, which enables the comparison of incidence, aetiological factors and type of stroke among these centres. This will help us with a better approach to investigate these patients in the relevant setting.
PP-19

Transient ischaemic attacks: the Western Health Model of Care

M Pathirage¹, L Van Raay¹, E Mackey¹, H L Horadagoda², V Chong¹, A Thrift³, P Ritchie², M Bryant², Z Matkovic¹, T Wijeratne¹
¹Department of Neurology, Western Hospital, Melbourne, Australia
²Department of Emergency Medicine, Western Hospital, Melbourne, Australia
³Department of Medicine, Monash Medical Centre, Monash University, Australia

Introduction: Patients with Transient Ischaemic Attacks (TIA) have an annual risk of stroke of 1%-15%. Almost 50% of the subsequent strokes occur in the first 30 days after TIA. Optimal care for TIA is uncertain, although recent studies provide evidence that early comprehensive assessment and treatment substantially reduce subsequent stroke and stroke unit admissions.

Objectives: To describe the pilot phase of the Western Health TIA (WESTIA) care pathway model and first year outcome in this metropolitan tertiary care hospital.

Methodology: Prior to introduction of the WESTIA care pathway in November 2009 all TIAs were admitted to the stroke unit. According to the WESTIA care pathway all TIA referrals were urgently assessed by the Emergency department physicians and the stroke team, led by a senior stroke neurologist. Patients were evaluated in the short stay unit (<24 hour hospital stay) to facilitate urgent investigations and treatment. Patients were subsequently followed up in the TIA clinic.

Results: In the first 12 months 339 patients presented to the Emergency Department with a suspected TIA, and 173 patients with confirmed TIA had follow up in the TIA clinic. Only one (0.6%) patient developed to stroke within 90-days of the TIA.

Conclusions: We report a low risk of stroke following TIA in our cohort. This may be at least partly attributed to both optimal secondary stroke prevention occurring in the primary care setting and in the emergency department setting. A prospective study is ongoing to provide further explanations of these findings.

PP-20

Systematic review on central post stroke pain

T Wijeratne¹, M Pathirage¹, R Helme², A Thrift³
¹Neuroscience Research Unit, Department of Neurology, Western Hospital, Australia
²Department of Neurology, Royal Melbourne Hospital, Australia
³Department of Medicine, Monash University, Australia

Introduction: Central post stroke pain (CPSP) is a neuropathic pain syndrome characterised by constant or intermittent pain in a body part occurring after a stroke and is associated with sensory abnormalities in painful region of the body. CPSP has been characterised by pain and sensory abnormalities in parts of the body which corresponds to the affected lesion in the brain and where no obvious nociceptive, psychogenic and peripheral neurogenic pain is present. Clinically CPSP can be accompanied by sensory findings such as allodynia, hyperparthia and hyperalgesia.

Methods: We conducted a Medline search using the key words “central post stroke pain”, “central post stroke pain and pathophysiology”, “central post stroke pain and treatment”, “thalamic pain”, “central post stroke pain and neuroimaging”, “central post stroke pain and hyperparthia” “central post stroke pain and neurophysiological investigations” from 1996 until June 2011 and then systematically reviewed.

Results: There are few epidemiological studies of CPSP. Age, sex and side of lesion do not consistently predict CPSP. Lesions in cerebral cortex, medulla and thalamus (lesions at any level of somatosensory pathways of the brain) could lead to CPSP. The dual combination of deafferentation and the subsequent development of neuronal hyperexcitability may play a key role in pathophysiology of CPSP. There are several class one and two studies on management of CPSP. Amitriptyline 75 mg daily significantly reduced pain in CPSP. In one study, pregabalin produced a clinically significant pain control in CPSP.

Conclusion: The exact prevalence of CPSP is difficult to determine (differences in methodology between studies, difficulty is differentiating CPSP from other pain types that can occur after a stroke etc). Prevalence of CPSP in post stroke patient population varies between 1% to 12%. Amitriptyline is recommended as an effective treatment for CPSP for some patients. Future prospective studies are urgently needed for proper collection and processing of data among CPSP patients.

PP-21

Knowledge of stroke symptoms and risk factors: comparison between a metropolitan hospital in Melbourne, Australia and a base hospital in Sri Lanka – a pilot study

P Wijesundera¹, L Van Raay¹, M Pathirage¹, N De Silva², N Jayawardena², H Tikiribandara², A Thrift³, Z Matkovic¹, T Wijeratne¹
¹Neuroscience Research Unit, Department of Neurology, Western Hospital, Melbourne, Australia
²Department of Medicine, Monash University, Australia
**PP-22**

**Effect of magnesium supplementation on carotid intima media thickness and flow mediated dilatation among patients in haemodialysis: double-blind randomized, placebo-controlled trial**

M Saadatnia, M Mortazavi, F Moinzadeh, S Shahidi, A Minagar  
*Isfahan University of Medical Sciences, Isfahan, Iran*

**Background:** Carotid intima media thickness (cIMT) is a trusted index of atherosclerosis. Indeed, brachial flow-mediated dilatation (bFMD) and C reactive protein (CRP) is functional and inflammatory markers of endothelium. Magnesium supplementation could inhibit arterial calcification and influence as a cofactor for acetylcholine-induced endothelium-dependent relaxation.

**Objectives:** The aim of the present study was to determine the efficacy of oral magnesium supplementation on endothelial function through evaluation of cIMT, bFMD, and CRP among hemodialysis (HD) patients.

**Methods:** This randomized controlled double-blind clinical trial consisted of 54 patients on HD in two university hospitals in Isfahan, Iran. One group was treated orally with 440 mg magnesium oxide (Mg) 3 times per week for 6 months (n=29) and the other matched group by placebo (n=25). IMT and bFMD were measured at the beginning and at 6 months.

**Results:** Serum levels of calcium, phosphorous, lipid profile, CRP, bicarbonate, and bFMD showed no significant differences between the two groups at baseline and at 6 months. At six months cIMT was significantly decreased in Mg group (0.84±0.13 and 0.76±0.13 mm, p=0.001). However, in placebo group at 6 months, cIMT was increased significantly (0.73±0.13 and 0.79±0.12 mm, p=0.003).

**Conclusion and recommendations:** The findings of this study suggest that the use of oral magnesium oxide may not improve CRP level as inflammatory marker of endothelium and FMD as a functional marker of endothelium. However, Mg may significantly decrease carotid IMT and atherosclerosis in ESRD patients on HD. These effects may proceed more according to inhibition of calcification through regulation PTH, Ca, and Ph.

**PP-23**

**Valvular heart disease in large and small vessel thrombosis stroke**

M Tajmirriahi, M Saadatnia  
*Isfahan University of Medical Sciences, Isfahan, Iran*

**Introduction:** Valvular heart disease can affect pulse wave contour. Indeed, pulse wave contour may be correlated with atherosclerosis.

**Objectives:** The aim of this study was to determine the valvular heart disease in small and large vessel thrombotic (SVT and LVT) stroke.

**Methods:** From 1 Jan 30 December of 2008 we included 90 LVT and 37 SVT. For all of the patients echocardiography was done and valvular heart disease were determined.

**Results:** Frequency of mitral stenosis, mitral regurgitation, tricuspid stenosis, tricuspid regurgitation, pulmonary stenosis and pulmonary regurgitation and aortic stenosis had not significant
differences in both groups. However, grade 1 and grade 2 of aortic regurgitation were seen in 12 (13.3%), 10 (11.1%) in LVT and 9 (24.3%) and 0 in SVT, respectively (P=0.04). There were no significant differences in non modifiable (sex, age) and modifiable conventional risk factors (hypertension, diabetes, hyperlipidemia, smoking, previous stroke, atrial fibrillation, ischemic heart disease) between two groups.

**Conclusion and recommendations:** Aortic regurgitation may be associated with LVT. It seems aortic regurgitation can increase pulsality in large vessels of brain that might induce shear stress and atherosclerosis in large vessel and lead to more LVT. Further studies with larger sample size are needed to confirm this new theory.

**PP-24**

The clinical feature of posterior circulation infarction compared to anterior circulation infarction

W Tao, D Wang, J Li, Z Hao, S Lin
The Stroke Clinical Research Unit, Department of Neurology, West China Hospital, Sichuan University, Chengdu, China

**Objectives:** We aimed to investigate the frequencies of common clinical manifestations in posterior circulation infarction (PCI) and determine whether major difference of clinical manifestations exists between PCI and anterior circulation infarction (ACI).

**Methodology:** Between 2006 and 2011, patients diagnosed of separated PCI or ACI by lesion location on MRI (gold standard) in Chengdu registry were enrolled. Clinical features were reviewed and compared in the two groups.

**Results:** Of the total 1072 patients, 272 (25.4%) diagnosed with PCI, the top three symptoms/signs in both PCI and ACI were the same: unilateral limb weakness (53.7% vs. 74.4%, p=0.000), central facial/lingual palsy (41.2% vs.61.8%, p=0.000) and unilateral hemisensory loss (39% vs.38.4%, p=0.863). Compared with ACI, dizziness (39% vs. 18.8%, p=0.000), nausea/vomit (32.4% vs.10.4%, p=0.000), ataxia (31.6% vs.5%, p=0.000), vertigo (19.1% vs. 1.9%, p=0.000) were more common in PCI. Special signs favored diagnosis of PCI but had low incidence, including diplopia (5.2% vs. 0.4%, p=0.000), hemianopia (4.1% vs. 1.4%, p=0.007), crossed paralysis (4% vs.0.2%, p=0.000), Horner's syndrome (3.7% vs.0%, p=0.000), oculomotor nerve paresis (3.3% vs.0%, p=0.000), crossed sensory disturbance (2.6% vs. 0%, p=0.000) and quadrantanopia (1.5% vs. 0%, p=0.000 ). Dysarthria (25% vs.24.6%, p=0.901), eyes movement disorder (12.1% vs. 12.8%, p=0.791), bilateral paralysis (10.3% vs. 6.9%, p=0.068) and bilateral sensory loss (1.8% vs.1.1%, p=0.558) did not differ significantly between the two groups.

**Conclusions:** In our study, no major difference was found in most common clinical features between PCI and ACI.

**PP-25**

Thalamic stroke in Nepal: a prospective study from a neurocentre

R Paudel, L J Thapa, B R Pokhrel, P V S Rana
College of Medical Sciences, Bharatpur, Nepal

**Background:** Thalamic stroke patients can present with myriad of presentations requiring a prompt diagnosis and management including surgery in few cases.

**Objective:** To study the clinical presentation, radiological features, and outcome of patients presenting with thalamic stroke.

**Methods:** A prospective study of 14 months (February 2009 till June 2010) evaluated all cases of thalamic stroke admitted in the Neurocenter of a 740 bedded teaching hospital (College of Medical Sciences-Teaching Hospital at Bharatpur) in Nepal. Patient details were entered into predesigned pro forma and analyzed as per the study objectives.

**Results:** Of the total 404 stroke cases, thalamic stroke was ‘12%; n= 29’ among which thalamic haemorrhage (n=18) outnumbered infarction (n=11). The male: female ratio of thalamic stroke was 1.7:1, with age ranging from 39 to 99 years and uncontrolled hypertension was observed in 68.9%(n=20) of these cases. The size of the thalamic haemorrhage varied from ‘moderate’ (2.1-3 cm; n=6) to ‘large’ size (3.1-4 cm; n=7) and four individuals had massive haemorrhage (more than 4.1cm). Common presentations were ‘hemiparesis with hemianesthesia’ (n=13) and ocular findings of ‘ptosis and gaze paresis’ (n=9). Most (n=10) of the thalamic infarction presented with various lacunar syndromes including ataxic hemiparesis (n=3), pure sensory stroke (n=3) and ‘motor and sensory stroke’ (n=2), subcortical aphasia (n=2). External ventricular drainage (EVD) was done in four cases of thalamic haemorrhage with obstructive hydrocephalus and deteriorating GCS during hospital admission. Of the thalamic haemorrhage (n=18), mortality during hospital stay was 22% (n=4) including one patient who developed ventriculitis postoperatively, and none of cases with infarction died.
Conclusion: In conclusion, thalamic haemorrhage is common in the Nepalese population and the mortality can be decreased if timely surgical intervention is done in selected patients.

PP-26

Cardiac disease in ischaemic strokes

A Arasalingam, S A C U Gunawardhana, A Fernando, P S Gunaratne

Neurology Unit 2 (Ward 16), National Hospital of Sri Lanka, Sri Lanka

Introduction: Cardiac disease, comprising both ischaemic heart disease and other non ischaemic cardiac diseases are important risk factors for ischaemic strokes.

Objectives: To study the pattern of cardiac disease in acute ischaemic strokes.

Methodology: A retrospective descriptive study analyzing the medical record of all patients with ischaemic strokes admitted to the stroke unit during 2007-2008. Relevant data with respect to cardiac disease in ischaemic stroke patients were analyzed and the findings were described as frequency percentages. The diagnosis of cardiac disease was based on clinical, ECG and echocardiogram findings.

Results: Of 204 patients with ischaemic strokes, subtypes according to the TOAST classification were 90(44.1%) large artery disease (LAD), 22 (10.8%) cardioembolic (CE) and 81 (39.7%) small vessel disease (SVD). 90 (44.11%) of the 204 had a cardiac disease, 45(22.06%) had ischaemic heart disease and 45(22.06%) had other cardiac diseases. 21(10.3%) had both ischaemic heart disease and other cardiac diseases. Of the cardiac diseases occurrence of ischaemic heart disease in LAD vs CE vs SVD was 24(26.67%) vs 7(31.81%) vs 10 (12.34%) (p<0.01) and other non ischaemic cardiac disease in LAD vs SVD vs CE was 16(72.72%) vs 10 (12.34%) (p<0.01). Of the 45 with other cardiac disease 24 (53.33%) had valvular heart disease; 12 (50%) multiple valvular lesions, 7(15.55%) mitral regurgitation, 3(6.66%) mitral valve prolapse, 1 mitral stenosis and 1 aortic regurgitation. 12(26.67%) had atrial fibrillation. 2 patients had ASD while no PFO were detected. Of the 7(15.55%) with intracardiac thrombi, 5 were left atrial thromb and 2 were left ventricular thrombus. All had a transthoracic echo while 4 also had transoesophageal echocardiograms.

Conclusion: Cardiac disease is significant in ischaemic stroke with non ischaemic cardiac disease being an important aetiology in cardio embolic strokes. A larger study would be needed to confirm the results.

PP-27

Cardiovascular risk factors and ischaemic strokes – is there a difference between the ischaemic stroke subtypes?

A Arasalingam, S C Somaratne, A Fernando, P S Gunaratne

Neurology Unit 2 (Ward 16), National Hospital of Sri Lanka, Sri Lanka

Introduction: Stroke, the fifth commonest cause of hospital deaths and a major cause of morbidity in Sri Lanka has not been studied in depth in our country and there is no documented data on stroke prevalence and risk factor profile in our population.

Objectives: To identify the cardiovascular risk factors in the different subtypes of ischaemic strokes according to the TOAST criteria.

Methodology: This is a retrospective descriptive study analyzing the medical records of all patients with ischaemic strokes admitted to the stroke unit during 2007 - 2008. The variables analyzed included demographic profile, cardiovascular risk factors and investigations relevant to the objectives of the study. The findings were described as frequency percentages.

Results: Of the 204 patients 104 (51%) were males and the mean age at presentation was 54.95 ± 15.03 for males and 57.65 ± 17.63 for females. Ischaemic stroke subtypes according to the TOAST classification were 90(44.1%) large artery disease (LAD), 22 (10.8%) cardioembolic (CE), 81 (39.7%) small vessel disease (SVD), 2 of other determined aetiology and 4 of undetermined aetiology. Frequency of occurrence of cardiovascular risk factors in LAD vs CE vs SVD for dyslipidaemia 65.56% vs 59.09% vs 70.37% (p=0.23); hypertension 58.89% vs 45.45% vs 67.9% (p= 0.2); diabetes mellitus 42.22% vs 36.36% vs 49.38% (p=0.5); cardiac diseases other than ischemic heart disease 21.1% vs 72.72% vs 12.34% (p < 0.001) and ischaemic heart disease 26.67% vs 31.81% vs 17.28% (p=0.34). 38 of the 90 (42.22%) with LAD and 41 of the 81 (50.62%) with SVD had 3 or more cardiovascular risk factors.

Conclusion: There was no significant difference in the cardiovascular risk factor profiles amongst the subtypes of ischaemic strokes except for cardiac disease other than ischaemic heart disease. A larger study is needed for confirmation.

PP-28

Impact of factor VIII and von Willebrand factor plasma levels in cerebral venous and sinus thrombosis: Are they independent risk factors?
M Saadatnia, T Shahsavarezadeh, S Haghioo  
Isfahan University of Medical Sciences, Isfahan, Iran

**Introduction:** Previous studies showed that high concentrations of factor VIII (FVIII) are associated with risk of venous thromboembolism (VTE). Indeed, independent role of von Willebrand factor (vWF) in VTE remains uncertain and controversial.

**Objectives:** The aim of this study was to assess plasma levels of FVIII, vWF and their association in patients with cerebral venous and sinus thrombosis (CVST).

**Methodology:** We prospectively included 25 CVST patients admitted to university hospital and 53 voluntary subjects for control group. FVIII and vWF were measured after 6 months when we stopped anticoagulant therapy.

**Results:** The mean FVIII and vWF levels were significantly higher in the CVST group compared to control group respectively (126.21 ± 54.69 IU/dl; 91.9± 48.8 IU/dl; p = 0. 012) (157.05 ±107.74 %; 94 ±84%; p = 0.01). Using analyses calculating the 95th percentile cut off values, we found high levels of FVIII in patients compared to controls (29.2%, 5%; p= 0.01) and odd ratio with 95% Confidence interval (CI) was 7.82 (1.46, 41.6). After adjustment for vWF levels, sex and age, the risk was remained significantly increased and odd ratio with 95% CI was 10.5 (1.1, 101.4) (p=0.41).

**Conclusions and recommendations:** FVIII is one of the most prevalent risk factors of CVST and may be associated with approximately 10-fold increased risk for developing CVST. This effect is independent of vWF levels. However, vWF is not an independent risk factor of CVST. We recommend evaluation of FVIII and vWF in all CVST patients after anticoagulant therapy.

---

**Management of acute stroke and stroke rehabilitation**

**PP-29**

**Citicoline in the treatment of intracerebral haemorrhage**

J J Secades  
Ferrer Group, Medical Department, Barcelona, Spain

The treatment of intracerebral haemorrhage (ICH) is still controversial, with a non-well defined strategy. In the pathophysiology of ICH it is possible that brain ischaemia plays a relevant role and then there is an opportunity to use a neuroprotective approach to try to minimize the effects of ischaemia in patients with ICH. In experimental models citicoline has shown beneficial effects in ICH. Citicoline is a neuroprotectant drug with some beneficial effects in human ischaemic stroke and with an excellent safety profile. Also citicoline has some evidence of a neuro-repairing effect. In 2006, we published the results of a pilot clinical trial of citicoline (2g/d/2 weeks) in ICH. 19 patients in each group were included in the study. The incidence of serious adverse events was not different among groups (4 patients in each group). One patient in the placebo group was categorised as independent (mRS <= 2) in comparison with 5 patients in the citicoline group (OR, 5.38; 95% CI, 0.55-52). In 2007, another study was finished in the Philippines. This was a randomized double blind, placebo-controlled, multicenter, parallel group study on patients with first ever supratentorial ICH given either 4g citicoline or placebo for 14 days from index stroke. A total of 182 patients were enrolled into this study. Results showed that those patients with favourable Barthel Index scores (50.8 vs 31.9) in the citicoline group than in placebo group respectively on day 90. Patients had favourable mRS score (46.1 vs 33.8) in the citicoline than in the placebo group on day 90. Also, the adverse events associated with citicoline were similar to the adverse events associated with placebo. In 2008, another study in the sequelar phase of ICH was published and showed that muscular strength in patients with ICH receiving citicoline increased. In a recent meta-analysis, it has been demonstrated a positive effect of citicoline in ICH patients improving the outcome, with an OR of 0.55 [95% CI 0.31-0.97, p=0.04]. Thus it looks like citicoline is safe and could be helpful in the treatment of ICH.

**PP-30**

**Autologous mononuclear stem cell transplantation in chronic ischaemic stroke**

P Srivastava  
All India Institute of Medical Sciences, Ansari Nagar, New Delhi, India

**Background:** The high prevalence and burden of Stroke on society has fuelled interest in regenerative medicine to repair the brain after an acute insult or restore maximum functionality in the shortest possible time. Stem cell transplantation promises to restore function after an ischaemic stroke. They are feasible, multipotent and have homing in characteristics. This study evaluates safety, feasibility and efficacy of autologous mononuclear (MNC) stem cell transplantation in
patients with chronic ischaemic stroke (CIS) using clinical scores and functional imaging (fMRI and DTI).

**Methods:** Twenty four (n=24) CIS patients were recruited with the inclusion criteria as: 3 months - 2 years of stroke onset, motor strength of hand muscles of at least 2; Brunnstrom stage of recovery: II-IV; NIHSS of between 4-24, conscious and able to comprehend. Fugl Meyer, modified Barthel index (mBI) and functional imaging parameters were used for assessment at baseline, 8 weeks and at 24 weeks. Twelve patients were administered with mean 50-60 million cells intravenously followed by 8 weeks of physiotherapy. Twelve patients served as controls.

**Results:** The laboratory tests (Hb %, RBC, WBC, platelets, liver and kidney function tests, PT time) on day 1, 3, 5 and 7 were within normal limits in MNC group. mBI showed statistically significant improvement (p>0.05). The mean FM, mBI, scores in the MNC group were more as compared to control group. There was an increased number of cluster activation of Brodmann areas BA 4, BA 6 post stem cell infusion compared to controls indicating neural plasticity. There was no significant change in FA ratios between the groups.

**Conclusion:** Cell therapy is safe and feasible and facilitates restoration of function in CIS. Stem cells operate not through an unidirectional mechanism i.e. forming neurons but rather as cellular mediators of many biological mechanisms that could provide a favourable outcome for recovery.

**PP-31**

**Bifrontal basal anterior interhemispheric approach for distal anterior cerebral artery aneurysms - advantages over other approaches**

R Chhabra, S K Gupta, S Mohindra, N K Khandelwal, S N Mathuriya

Postgraduate Institute of Medical Education and Research, Chandigarh, India

**Background:** Distal anterior cerebral artery (DACA) aneurysms are uncommon. Most authors have reported technical difficulties during surgery for these aneurysms, and a variety of surgical approaches have been advocated.

**Methods:** Over a period of 10 years (1999-2008), 112 patients with DACA aneurysms were operated. Sixty-eight of these were operated on through the bifrontal basal anterior interhemispheric approach. Of the 68 patients, 75% were in poor clinical grade (Hunt and Hess grade III-V) and 91.2% had a Fisher grade III and IV on computed tomography scan. A surgical trajectory about 2 to 3 cm superior to the anterior cranial fossa floor led directly to the aneurysm. Proximal control was achieved before aneurysm dissection and facilitate parallel clamping.

**Results:** Good outcome (Glasgow Outcome Scale V and IV) was seen in 60.2% of the patients, 20.6% had a poor outcome, and 19.1% died. The cause of death in most patients was found to be a poor clinical grade, postoperative infarct or presence of multiple aneurysms.

**Conclusions:** The advantages of the bifrontal basal anterior interhemispheric approach are the following: (a) It provided the shortest and a direct trajectory to the aneurysm. (b) Proximal control of the parent A2 vessels could be easily achieved. (c) Release of cerebrospinal fluid from basal cisterns could be done, if necessary. (d) There was a minimal distortion of or traction over the aneurysm.

**PP-32**

**Comparison of CT perfusion to multimodal MRI in ischaemic stroke**

B C V Campbell, S Christensen, C R Levi, P M Desmond, G A Donnan, S M Davis, M W Parsons

1Departments of Medicine and Neurology, The Royal Melbourne Hospital, University of Melbourne, Parkville, Australia

2Department of Radiology, Royal Melbourne Hospital, University of Melbourne, Parkville, Australia

3Department of Neurology and Hunter Medical Research Institute, John Hunter Hospital, University of Newcastle, Australia

4Department of Radiology, Royal Melbourne Hospital, University of Melbourne, Parkville, Australia

5Florey Neuroscience Institutes (G.A.D.), University of Melbourne, Parkville, Australia

**Introduction:** CT-perfusion (CTP) is widely and rapidly accessible for imaging acute ischaemic stroke. However, there has been limited validation of CTP-based parameters against the more intensively studied MRI perfusion-diffusion mismatch paradigm.

**Objectives:** We tested common CTP parameters against contemporaneous perfusion-diffusion-MRI.

**Methodology:** Acute ischaemic stroke patients <6hr after onset had CTP and perfusion-diffusion-MRI within 1hr, before any reperfusion therapies. CTP maps were generated of relative time-to-peak (TTP), absolute and relative cerebral blood volume (CBV), cerebral blood flow (CBF), mean transit time (MTT) and time-to-peak of the deconvolved tissue-residue-function (Tmax). The diffusion lesion was manually outlined to its maximal visual extent. Optimal CTP parameters to match diffusion and perfusion lesions were
determined. Agreement with MR perfusion-diffusion mismatch in co-registered regions was assessed.

Results: In analysis of 98 CTP slabs (54 patients, median onset to CT 190min, median CT to MR 30min), relative CBF best matched diffusion-MRI for infarct core (AUC 0.79, 95%CI 0.77-81), significantly better than absolute CBV (AUC 0.74, 95%CI 0.73-0.76, p<0.05). Spatial correlation of both CT Tmax and TTP with MR Tmax values was limited (Tmax r=0.43, TTP r=0.20). Volumetric agreement was, however, sufficient for 90% concordance between CT and MRI-based mismatch status.

Conclusions and recommendations: Using CTP, relative-CBF and Tmax can achieve similar mismatch determinations to perfusion-diffusion-MRI. CTP may allow more widespread application of the "mismatch" paradigm in clinical practice and trials.

PP-33
Stroke Patients and alternative medicine treatments in India (SPAM Study)
P Kaur, G Toor, R Arora, R S Bhullar, J D Pandian
College of Physiotherapy and Stroke Unit, Christian Medical College, Ludhiana, Punjab, India

Background: Alternative medicines (AM) are commonly used by stroke patients in developing countries like India. Very often patients stop western medicine treatments and exclusively follow AM treatments which can lead to stroke recurrence. Our objectives were to study the pattern of AM use and also the factors that predict the use of AM in stroke patients.

Methods: This study was carried out in the Stroke Units of Christian Medical College, Ludhiana and Sree Chitra Tirunal Institute for Medical Sciences and Technology, Thiruvananthapuram from June 2010 to December 2010. Patients were interviewed using a structured questionnaire (≥ 6 months post stroke). Demographic details and stroke characteristics were documented. Outcome was assessed using modified Rankin scale (mRS). Statistical analysis were done using SPSS version 16.0.

Result: 315 stroke patients were interviewed, mean age was 57.4±12.9 years and 229 (72.9 %) were men. Out of 315 patients, 114 (36.2%) had used AM treatments. They are as follows; ayurvedic massage 70 (61.9%), intravenous fluids 21 (18.6%), herbal medicines 15 (13.3%), homeopathy 14 (12.4%), witchcraft 3 (2.7%), acupuncture 3 (2.7%), opium intake 10 (8.8%) and other non-conventional treatments 10 (8.8%). Patients with severe stroke (NIHSS 7.3±4.9, p<0.0001) and who were working (p<0.0001) preferred AM treatments. Patients who had limb weakness (p<0.0001), hypertension (p<0.0001), subjects with ischemic stroke (p<0.0001) and patients with poor outcome (mRs >2, p<0.0001) often utilized AM treatments. Thirty three (33%) patients noticed significant improvement after taking AM. Patients who received AM treatments were less likely to discontinue western medicine treatment as compared to patients who did not receive AM treatment (86.7% vs 40.8%, p<0.0001).

Conclusion: One third of our patients opted for AM. Presence of limb weakness, hypertension, ischaemic stroke, severe stroke and poor outcome predicted the use of AM. Patients who use AM tend to remain on secondary prevention strategies.

PP-34
The safety and efficacy of intra-arterial thrombolysis following full dose intravenous thrombolysis in acute ischaemic stroke patients with occluded MCA: a comparison with intravenous thrombolysis alone
D Sanak, M Kocher, T Veverka, M Kral
Comprehensive Stroke Center, Department of Neurology, Palacky Medical School and University Hospital, Czech Republic

Introduction: The early recanalization of the occluded cerebral artery is important for clinical improvement in acute ischaemic stroke (IS) patients treated with intravenous thrombolysis (IVT). Nevertheless, the rate of achieved recanalizations is low. The aim was to compare the safety and efficacy of intra-arterial thrombolysis (IAT) following full-dose IVT to IVT alone in acute IS patients with occluded middle cerebral artery (MCA).

Methods: In a single center observational study, 79 consecutive IS patients with MCA (M1-2 segment) occlusion were treated either with IVT alone (Group 1) or with full dose IVT followed by IAT (Group 2). Initial stroke severity was assessed using National Institutes of Health Stroke Scale (NIHSS). Rate of achieved recanalizations, occurrence of intracerebral hemorrhages (ICH) including symptomatic (SICH) and 90day clinical outcome were assessed using modified Rankin Scale (mRS) and compared in both groups.

Results: Group 1 consisted of 50 patients (24 males, mean age 70.8±10.2 years) and Group 2 of 29 patients (14 males, mean age 67.8±10.0 years). No difference was found in the initial NIHSS (median 16 vs. 17, p=0.125). The rate of all achieved MCA recanalizations was higher in Group 2 (75.9% vs. 32.0%, p=0.0002). No difference was found in the SICH occurrence (6.0% vs. 6.9%, p=1.000) and in 90-day clinical outcome (median mRS 5 vs. 4, p=0.909) including the number of patients with mRS 0-2 (28.0% versus 34.5%,
In Group 2, patients with mRS 0-2 had significantly shorter time to recanalisation compared to patients with mRS 3-6 (median time 212.5 min vs. 265.0 min, p=0.019).

Conclusion: IAT following full dose IVT was associated with higher rate of MCA recanalizations with similar SICH occurrence compared to IVT alone. 90-day clinical outcome was similar to IVT alone and depended on TR.

PP-35

D Sanak, M Kocher, M Král, T Veľverka, R Herzig
Comprehensive Stroke Center, Department of Neurology, Palacký Medical School and University Hospital, Czech Republic

Introduction: The early recanalisation of occluded cerebral artery is crucial for a good clinical outcome in acute ischaemic stroke (IS) patients. Intravenous thrombolysis (IVT) has low effectiveness and in case of using intra-arterial thrombolysis, the risk of intracerebral haemorrhage (ICH) may significantly increase. The aim was to evaluate safety and efficacy of mechanical endovascular treatment of occluded cerebral artery using stent Solitaire AB.

Subject and methods: Acute IS patients with documented middle cerebral artery (MCA) or basilar artery (BA) occlusion were included in this prospective study. Stroke severity was assessed using National Institutes of Stroke Scale (NIHSS), 90 day clinical outcome using modified Rankin Scale (mRS); good outcome was scored as 0-2. Early neurological improvement (ENI) was defined as an increase of 4 or more points in NIHSS after 24 hours. Achieved recanalisation was quantified using thrombolysis in cerebral ischaemia (TICI) scale.

Results: Fourteen consecutives IS patients (8 males, mean age: 62 ± 18.9 years) with initial median NIHSS 20 points were included in study. Eleven (78.5%) patients were treated with IVT firstly. Recanalization (including partial) was achieved in 13 (92.9%) patients, while complete (TICI 3) was presented in 7 (50%) patients. Mean time to recanalisation was 227 ± 54.7 min. ENI was presented in 9 (63.4%) patients. ICH has occurred only in one (7.1 %) patient and was not symptomatic. 7 day mortality was 7.1%. Median mRS was 2.5, while 50% of patients had mRS 0-2.

Conclusion: In this pilot study, endovascular treatment of cerebral artery occlusion using self-expanding stent Solitaire AB seems to be safe and highly effective in acute IS patients, nevertheless data from large multicenter clinical trials are needed.

PP-36
Thrombolysis of a left middle cerebral artery infarct in a 36 year old with bloody diarrhoea – a case report

N H Gange, M Lameris, K Metcalf
Norfolk and Norwich University Hospital, Norwich, UK

Introduction: A young woman presented to the surgical department with bloody diarrhoea from flaring up of her ulcerative colitis 2 weeks post partum. Few hours later, she developed an acute left MCA infarct with dense right sided weakness. Dilemma was whether acute thrombolysis was safe in this situation. She was subsequently thrombolysed without complications and subsequent investigations showed a right ventricular thrombus and a pulmonary embolism.

Objectives: To assess the safety of thrombolysis with active inflammatory bowel disease (IBD). To determine the relationship between inflammatory bowel disease and stroke. To determine the relationship between venous thrombosis and arterial embolism

Methodology: Comprehensive literature search (MEDLINE) was carried out in regard to above discussion points of this case. Then these were analyzed as appropriate to the relevance of the study. Furthermore interesting investigation findings (Cerebral and cardiac MRI, CT pulmonary angiogram and trans-esophageal echocardiogram) were taken into account when analyzing this case.

Results: No previous data was found as to the safety of acute stroke thrombolysis in patients with acute bloody diarrhea from IBD. In this case it indicated a safe approach. Literature review showed a close relationship between IBD and stroke.

Conclusions & Recommendations: We demonstrated that with proper risk assessment stroke thrombolysis could be performed in selected patients with acute IBD with bloody diarrhoea. However it is difficult draw definite conclusions based on just a single case study and further research is needed in this area.

PP-37
The application of new physical training program for stroke rehabilitation: a case study among stroke survivors

I. M Win, D YG M Ag, Z Bacho, S C Li
Universiti Malaysia Sabah, Malaysia
**Introduction:** Core body muscles play an important role in antigravity postures such as sitting, standing, walking and in the stabilization of proximal body parts during voluntary limb movement. Studies by Seelen et al (1998) and Chen et al (2003) showed that core muscle strengthening contributes to increased functional abilities in people with disability.

**Objective:** A pilot study aimed to evaluate effectiveness of core body exercise program for stroke rehabilitation.

**Method:** Three stroke survivors participated in this new physical training program design study using Core Muscle. Each participant was prescribed a specifically designed training program. All clients were instructed to train 3 days of the week for 12 weeks. Exercise was begun with seated rowing exercise for 20 min (multiple 10 min) and adding with 5 types core muscle strength exercise either using machine, free weight or body weight, 1-3 sets, 10-15 repetitions. A variety of exercises was prescribed every week to avoid monotony. Outcome on independency and risks factors for recurrence of stroke were assessed at baseline and after 12 weeks using Barthel Index, CRP, cholesterol, HDL, LDL and fasting blood sugar investigation.

**Results:** Results showed a gradual improvement in independency level and functional abilities. CRP and cholesterol decreased significantly in all subjects. FBS, HDL and LDL were all controlled to within the normal reference range. These findings may partly explain the effectiveness of this new rehabilitation program in improving functional abilities and independence for stroke patients. Combination of these therapeutic programmes with appropriate pharmacological medications could be used to prevent recurrent strokes and cardiovascular events.

**Conclusion & recommendations:** Future studies with greater number of clients and randomized controlled trial design are needed to reveal further benefit of such a rehabilitation program on stroke survivors.

**PP-38**

**Assessment of NIHSS components involving mastication and swallowing as risk factors for pneumonia in acute stroke**

K S Ng1, I Looi1, A B Manocha1, S N Nazifah2, A A Zariah1

1Hospital Seberang Jaya, Pulau Pinang, Malaysia
2Hospital Sultanah Nur Zahira, Terengganu, Malaysia

**Introduction:** Aspiration pneumonia is a recognized complication in acute stroke. It results in significant morbidity and mortality. High NIHSS (National Institute of Health Stroke Scale) score is known as a significant risk factor for pneumonia. However, there are many components in NIHSS that can affect the mechanism of swallowing and mastication.

**Objective:** In this study, we evaluated some components in NIHSS that are thought to affect the process of mastication and swallowing. They could be associated with significant risk of pneumonia. Components affected are consciousness, facial palsy, dysarthria and aphasia. We excluded NIHSS 1b and 1c but included 1a in this abstract for conscious level assessment.

**Methods:** We examined data from National Stroke Registry of Malaysia in 2010. Using Pearson Chi Square statistical method, we calculated the level of significance.

**Results:** We found statistically significant association of consciousness, facial palsy, dysarthria and aphasia with the risk of pneumonia. For impaired consciousness, 48.0% (96/200) of stroke patients developed pneumonia versus 12.8% (63/494) in stroke patients with full consciousness (p<0.05). For stroke patients who had facial palsy, 30.7% (143/466) developed pneumonia versus 6.8% (15/220) in those without facial palsy (p<0.05). Aphasia is also a risk factor for pneumonia, where 41.1% (116/282) of stroke patients developed pneumonia compared to 10.1% (40/396) of stroke patients without aphasia (p<0.05). Finally, 35.0% (135/386) of dysarthric patients developed pneumonia compared to 7.6% (22/290) of stroke patients without dysarthria (p<0.05).

**Conclusions:** Acute stroke patients with NIHSS components involving impaired consciousness, facial palsy, dysarthria and aphasia are significant risk factors associated with pneumonia.

**PP-39**

**Surgery versus conservative treatment in Intracerebral Haemorrhage (ICH): a prospective cohort study**

W Dong, J Li, Q Li, H Zhou, M Liu

Department of Neurology, West China Hospital, Sichuan University, Chengdu, China

**Introduction:** The role of surgery for ICH remains controversial.

**Objective:** We aim to observe the effects of surgery compared with conservative treatment, on the long term functional outcome in Chinese ICH patients.

**Methods:** A hospital-based prospective cohort study consecutively registered cases of ICH in West China Hospital, between 2009/Jan/01 and 2010/Dec/01. Functional outcome was followed up at 1, 3 and 6 months from onset. Logistic analysis was employed to adjust for other prognostic factors.
Results: A total of 910 consecutive ICH cases were recruited, including 254 surgery patients (27.9%) and 656 non-surgery patients (72.1%). The unbalanced baseline information was age (56.5 years vs. 60.3 years), Glasgow Coma Scale (GCS) score (10.2 vs. 11.9), hyperglycemia at admission (46.2% vs. 36.1%) and different bleeding sites. Median hospital stay was 6.0 (Inter Quarter Range, IQR 3.0–10.0) days. After adjusting baseline factors, significant difference was recorded between the two groups in case fatality at 6 month: 23.5% vs. 29.6% [adjusted OR 0.330 (CI 0.173–0.632), p=0.001], while rates of death/dependency were significantly higher in surgery group at 1, 3 months. Sub-analysis of severe ICH patients (GCS score 3–8, n=282) revealed significantly lower case fatality in surgery group at 6 months (40.4% vs. 78.6% [adjusted OR 0.243 (0.097–0.608), p<0.001], with no significant difference in rate of death/dependency between groups.

Conclusion: The study illustrates that surgical patients showed higher survival rate than their conservatively treated counterparts, but were at increased risk of functional dependency. Severe ICH patients may benefit more from surgery. However this finding needs to be confirmed by well-designed randomized clinical trials.

PP-40

Guidelines 2007 on collaboration in brain attack management in the north-west Tama area in Tokyo

K Ohta, K Shimizu, H Ohtaka, Y Takasato, Y Shinohara
Department of Neurology, Tachikawa Hospital, Japan

Objectives: To develop a system for collaboration in the treatment of brain attacks in the north-west Tama health care region in Tokyo (6 cities with a population of 650,000 people).

Methods and results: In 2005, the hospitals, clinics, medical associations, emergency medical technicians (EMTs), cities and public health centers in this region established an investigative commission for promoting collaboration in the treatment of stroke, and implemented a questionnaire survey for hospitals and clinics. When brain attack patients did arrive at the hospital, 78% of the clinics requested an ambulance, and 41% of these left the selection of the destination hospital to EMTs. On the other hand, patients were able to depart within 15 minutes in a mere 16% of clinics that specified a destination hospital. 42% of clinics that received a phone call from a patient suspected of a brain attack advised visiting the clinic rather than requesting an ambulance immediately. Of the 24 hospitals in this region, only 3 hospitals (12.5%) satisfied the Japan Stroke Society facility criteria for intravenous tPA therapy (iv-tPA). The investigative commission drafted guidelines on collaboration in brain attack management in 2007. Their framework comprises (1) educational activities for citizens, (2) requesting an ambulance immediately after onset, (3) selection of a destination hospital by EMTs, and (4) disclosure of the diagnosis and treatment system of hospitals specializing in stroke. Also, iv-tPA calendars were distributed indicating hospitals where iv-tPA is available per day and hour. These were distributed on a monthly basis to medical institutions and fire stations to help EMTs determine a destination hospital. This was a success as the time between onset of brain attack and admission to a hospital was shortened, and there was increased administration of iv-tPA.

Conclusions: The application of collaboration guidelines and iv-tPA calendars improves treatment of brain attacks.

PP-41

Factors of symptom persistence in the diffusion negative ischaemic stroke

J Rha, H Park, C Song, Y Choi, I Han
Inha University Medical College, Incheon, Korea

Introduction: The diffusion weighted image (DWI) is a sensitive tool for diagnosing acute ischemic stroke. However, clinically acute stroke is not always accompanied by positive DWI lesion. In this diffusion negative ischemic stroke (DNIS), the clinical course such as symptom persistence would be difficult to predict.

Objectives: We investigated which factors are associated with the clinical course in the DNIS.

Methods: We retrospectively reviewed data from prospectively collected Inha university hospital stroke registry. All the registered patients admitted within 1 week of symptom onset, and took routine stroke work up including DWI. Adjudication of ischaemic stroke was made by agreement of two or more neurologists at the weekly stroke team meeting, when the stroke is the most plausible diagnosis considering the clinical and imaging findings. We identified and divided the DNIS into two groups, according to the persistence of symptoms after seven days, and analyzed the differences in clinical and imaging factors between two groups.

Results: From January 2007 to December 2010, a total of 1398 subjects were registered and 142 DNIS patients were identified. Compared to the diffusion positive ischemic stroke, the DNIS patients were younger, had less atrial fibrillation and hypertension. Among them, 81 patients became fully recovered and had no
symptoms after 7 days from onset. Compared to the 61 patients with persistent symptoms, ABCD2 score, NIHSS on admission, and the frequency of perfusion delay on perfusion MRI were lower, and the interval between onset and DWI was longer in the patients with reversible symptoms. In the multivariable analysis, initial NIHSS and perfusion delay were independently associated with persistent symptoms (initial NIHSS, p<0.001, OR 17.2, 95% CI 5.5–54.0; perfusion delay, p=0.03, OR 36.7, 95% CI 1.4–977.0).

**Conclusion:** Our results suggest that the perfusion MRI and initial clinical status are related to the symptom persistence in the DNIS.

**PP-42**

**The cochrane systematic review of calcium antagonists for acute ischaemic stroke**

J Zhang, J Yang, M Liu, C Zhang
West China Hospital, China

**Objective:** To determine safety and efficiency of calcium antagonists for patients of acute ischaemic stroke.

**Methods:** All true randomized trials comparing a calcium antagonist with control in patients of acute ischaemic stroke were included from the following databases (last searched: November 2010), the Cochrane Stroke Group Trials Register, the Cochrane Central Register of Controlled Trials (The Cochrane Library, latest issue), MEDLINE (from 1950), EMBASE (from 1980), and four Chinese databases. Outcome measures included main outcome (poor outcome), defined as death or dependency and secondary outcomes, including adverse events, hypotension, recurrent stroke.

**Results:** 34 randomized trials with 7763 patients were included. The quality of these trials was generally good. No effect of calcium antagonists on poor outcome at the end of follow-up (OR1.08; 95% CI 0.97/1.19), or on death at the end of follow-up (OR 1.09, 95% CI 0.97/1.23) was found. Intravenous administration of calcium antagonists could increase the number of patients with poor outcome (OR1.22; 95% CI 0.99/1.50) compared with oral administration (OR1.04; 95% CI 0.92/1.17) (indirect comparisons). Comparisons of different doses of nimodipine suggested that the highest doses were associated with poorer outcome. Administration within 12 hours of onset could increase the proportion of patients with poor outcome, but this effect was largely due to the poor results associated with intravenous administration. A subgroup analysis on nimodipine (oral, 120 mg/day) started within 12 hours of stroke onset, did not show a beneficial effect on poor outcome (OR 1.03, 95% CI 0.80/1.33), and on death (OR 0.90, 95% CI 0.65/1.26).

**Conclusions:** No evidence was available to justify the use of calcium antagonists in patients with ischaemic stroke. Intravenous administration of calcium antagonists, highest doses nimodipine and administration within 12 hours of onset were associated with the poorer outcome.

**PP-43**

**Cerebral percutaneous transluminal angioplasty with stenting in patients with acute middle cerebral artery occlusion – case-control study**

D Skoloudik, M Kuliha, M Roubec, D Sanak, R Herzig
University Hospital Ostrava, Czech Republic

**Objectives:** Early recanalization of brain artery occlusion predicts 3-month independency in acute ischaemic stroke (AIS) patients. Cerebral percutaneous transluminal angioplasty with stenting (cPTAS) is an experimental method tested in AIS treatment.

**Methodology:** Prospective, bicentric, case-control study was used. 106 patients (62 males, age 25-86, mean 65.8 +/- 12.2 years) with AIS due to middle cerebral artery (MCA) main stem occlusion were enrolled. 75 patients fulfilling criteria received intravenous thrombolysis (IVT) within 4.5 hours since AIS onset. No further recanalization therapy was used in 26 (35%) IVT treated patients with achieved MCA recanalization (Group 1). Patients with IVT failure after 60 minutes were randomized into 2 subgroups - 23 patients were treated with cPTAS (Group 2), no further recanalization therapy was used in 26 patients (Group 3). CPTAS within 8.0 hours since AIS onset was applied also in all 31 non-IVT patients (Group 4). Neurological deficit on admission (using NIHSS), MCA recanalization at the end of IVT/cPTAS, occurrence of symptomatic intracerebral hemorrhage (SICH), and 3-month clinical outcome (using mRS) were evaluated.

**Results:** In the particular groups, median NIHSS on admission was 13.5, 16.0, 15.5, 15.0 (p>0.05); SICH occurred in 4%, 4%, 3% patients, resp. (p>0.05); favorable 3-month clinical outcome (mRS 0-3) was achieved in 65%, 31%, 52%, 52% patients, resp. (statistically significant difference between Groups 2 and 3, p=0.048). Favorable 3-month clinical outcome difference was not statistically significant between IVT only (Groups 1+3) and cPTAS only (Group 4) treated patients (48% vs. 51%, p>0.05). Complete MCA recanalization after cPTAS was achieved in 29 (54%) patients.

**Conclusions:** In the presented study, cPTAS seems to be a safe and effective treatment option in AIS patients with MCA occlusion contraindicated to IVT or with IVT failure.
**PP-44**

**Decompressive craniectomy for malignant cerebral oedema of cortical venous thrombosis: an analysis of 13 patients**

S Mohindra, A Umredkar, N Singla, S K Gupta  
Postgraduate Institute of Medical Education and Research, Chandigarh, India

**Objective:** Cortical venous thrombosis (CVT) is a rare cause of stroke. A few cases of this entity take up a fulminant downhill course, necessitating surgical intervention. We describe a series of 13 patients, who underwent decompressive craniectomy, so as to overcome malignant cerebral oedema in consequence to CVT.

**Methods:** Retrospective study of 13 patients, who underwent decompressive craniectomies for malignant CVT is presented. All patients had supratentorial cortical lesions, attributable to CVT. The clinical presentation, predispositions, radiological findings and surgical details are described.

**Results:** There were 9 females, 4 males with a mean age of 29.3 years. At the time of malignant worsening, all but 4 patients had sub-cortical bleeds. The median deviation of septum pellucidum was 11 mm, while 4 patients had unilateral dilated, non-reactive pupil. All 13 patients underwent "decompressive craniectomies", only external decompression in 4, and both external and internal decompression in 9. Eleven patients survived, with good outcome (GOS = 5, n = 5; GOS = 4, n = 6). At last follow up (median 35 months; mean 39 months), the KPS (Karnofsky Performance Status Scale) was 90 for 5, 80 for 4, and 70 for two survivors.

**Conclusion:** Timely recognition of failure of medical management and an appropriately timed surgical intervention may help to salvage CVT patients, who develop malignant cerebral edema.

**PP-45**

**Post stroke depression: Is it beyond disability?**

S A C U Gunawardhana, S C Somaratna, A Arasalingam, P S Gunaratne  
Unit 2, Institute of Neurology, National Hospital of Sri Lanka, Sri Lanka

**Introduction:** Post stroke depression (PSD) is commonly explained as an expected psychological reaction of the patient to his disability. Some studies have postulated cerebral vascular injuries provoke specific emotional disturbances. Hence, the objective was to make a comparison and study the depressive symptoms between a group of patients with stroke and non stroke with equal disability.

**Method:** This study included 40 consecutively admitted ischemic stroke (IS) patients who were compared with 40 patients with spinal pathologies (SP) matched for age, sex and disability levels. Patients with previous neurological disorders, past psychiatric disorders, current severe medical disorders, and stroke producing dysphagia or aphasia were excluded. Both groups were examined within 7 to 30 days of the disease onset for functional disabilities with modified Barthel Index (BI) and modified Rankin scale (mRS). The groups were also assessed for depression with Hospital Anxiety and Depression Scale (HADS) and Geriatric Depression Scale (GDS).

**Results:** Mean age of IS and SP groups were 58.3 (SD 12.6) and 52.7(SD 12.1) years respectively. In both groups sex ratio was M: F 2:1.3. In IS subgroup the mean BI and RS was 5.1 and 4.0 and in SP group it was 6.0 and 3.5. In the IS subgroup there were 16 (40%) patients with depression according to HADS and 12 (30%) according to GDS. In the SP group there were only 8 (20%) patients according to both HADS and GDS. Compared to SP patients, occurrence of depression is significantly high in IS patients. (p < 0.001)

**Conclusion:** We conclude that mood disorder is a more specific complication of stroke than simply a response to the motor disability.

**PP-46**

**Functional outcome of haemorrhagic and ischaemic stroke in a rehabilitation setting: a matched comparison**

S A C U Gunawardhana, C Jayakanthi, P S Gunaratne  
Unit 2, Institute of Neurology, National Hospital of Sri Lanka, Sri Lanka

**Background:** Intracerebral haemorrhage (ICH) is associated with a higher risk of mortality compared with ischaemic stroke (IS) but, it is believed that ICH survivors have better neurological and functional prognoses. Availability of data related to outcome difference in two groups is limited. Hence, the objective of this study is to assess the influence of stroke aetiology in rehabilitation outcome.

**Method:** This was a case-control study of 96 patients admitted to stroke unit at National Hospital of Sri Lanka from 2008 to 2010 with sequelae of first stroke. A Total of 48 consecutive patients with ICH were compared with 48 IS patients matched for age (within 3 year), sex, dexterity, stroke severity, basal disability, and onset admission interval (within 5 days) who were different only in terms of stroke aetiology, infarction
versus haemorrhage. On discharge functional outcome of the ICH and IS subgroups was analyzed and the improvement of disability according to Modified Barthel index (BI) and Modified Rankin's scale (RS) were compared.

**Results:** Mean age of ICH and IS groups were 61.3 and 63.4 years respectively. In both groups sex ratio (M: F 1:1.4) and hemispheric involvement (dominant 48%, non dominant 52%) were common. In both subgroups, on admission mean BI and RS were 5.9 and 4.7. Length of rehabilitation unit stay in ICH and IS groups were 34 and 39 days respectively (p = 0.43). At discharge, according to the BI and RS, the mean functional outcome improvement in ICH group (BI 8.3, RS 2.8) was statistically significant than in IS group (BI 5.1, RS 1.2) (p <0.001).

**Conclusion:** The results of this study provide further evidence of better functional prognosis in survivors of haemorrhagic stroke comparative to ischaemic stroke.

**PP-47**

**Evaluation of efficacy of acute stroke care programme at the National Hospital of Sri Lanka Unit 2**

D S D Jayaratne, P S Gunaratne

Neurology Unit 2, National Hospital Sri Lanka, Sri Lanka

**Objectives:** Tissue plasminogen activator (tPA) is a proven intervention for acute ischaemic stroke presenting within 4.5 hours of symptom onset. Analysis of the National Institute of Neurological Disorders and Stroke (NINDS) tPA study shows earlier administration of tPA with greater functional recovery. We explored the means to improve the thrombolytic service and to identify access blocks to efficiency.

**Methodology:** A retrospective review was done on patients, presented with features of acute stroke to the outpatient department which were referred to Neurology Unit 2 from September 2010 to June 2011. Data included symptom-to-door, door-to-CT department, door-to-CT-Film, door-to-CT interpretation, door-to-needle, and onset-to-needle times. They were compared against the time frames recommended by NINDS. Reasons for not giving thrombolysis were also explored.

**Results:** During the period, among 71 patients referred, 9 were eligible to undergo thrombolytic therapy. The mean onset-to-door; door-to-CT department; door-to-CT-Film, and door-to-CT interpretation were; 01 hour 13 minutes (SD± 52 minutes); 40mts (SD± 21 minutes), 50mts (SD±25minutes) and 01 hour 10 minutes (SD±25, minutes) respectively. The mean door to needle time and onset to needle time were 01 hour 20 minutes (SD±32 minutes) and 02 hours and 02 minutes (SD±48 minutes). There is a 25 minute delay in each door-to-CT film and door-to-CT interpretation times and a 20 minute delay in door-to-needle time when compared to NINDS recommendations. The major contribution for the delay appeared from the door-to-CT department time. Intracranial haemorrhage was the most common reason for ineligibility for tPA.

**Conclusions and recommendations:** Although the door-to-needle time was well within 4.5 hours; there is a need to improve door-to-needle, door-to-CT-Film, door-to-CT interpretation times and especially the door-to-CT department time in order to meet the NINDS recommendations. A CT scanner within the Emergency Treatment Unit premises (which is currently situated 300M away) would improve timing.

**PP-48**

**A protocol driven model for the rapid initiation of stroke thrombolysis in a metropolitan hospital, Melbourne Australia**

M Pathirage¹, L Van Raay¹, H L Horadagoda¹, M Thrift¹, A Mollo¹, J Walsh¹, P Ritchie², M Bryant³, Z Matkovic¹, T Wijeratne¹

¹Department of Neurology, Western Hospital, Melbourne, Australia
²Department of Emergency Medicine, Western Hospital, Melbourne, Australia
³Department of Medicine, Monash Medical Centre, Monash University, Australia

**Introduction:** Stroke is the third leading cause of death and also a leading cause of adult disability in Australia. Intravenous tissue plasminogen activator (tPA) is the only approved acute medical therapy for patients with ischaemic stroke. Patients who receive tPA within 4.5 hours of ischemic stroke onset are at least 30% more likely to have little or no disability compared to those who are not treated with tPA. In Australia, the proportion of patients with ischaemic stroke who receive thrombolytic therapy is low. An audit of eight metropolitan tertiary hospitals in 2007 found that <1% of ischaemic stroke patients received thrombolytic therapy.

**Objectives:** To assess the efficacy and safety of a 24 hour comprehensive protocol-driven model for rapid assessment and thrombolysis of stroke patients in the emergency department(ED) at Western Health (WH).

**Methodology:** The Western health acute stroke care protocol was initiated in the ED at WH, Melbourne, in March 2009. It applies 24 hour per day. The protocol was developed by the stroke unit with the collaboration from emergency and radiology departments. The stroke team lead by a dedicated stroke physician provided...
PP-49
Presence of asymmetry of internal cerebral veins on the follow up CT angiography is associated with poor outcome in anterior circulation ischemic stroke patients treated with intravenous thrombolysis

P K Loh, K W P Ng, N Venketasubramanian, B P L Chan, V K Sharma
National University Hospital, Singapore

Background: Significant numbers of acute ischemic stroke (AIS) patients recover with timely intravenous tissue plasminogen activator (IV-TPA). However, recovery remain variable. Early identification of reliable predictors of functional outcomes is important for planning rehabilitation strategies. We hypothesized that cerebral hypoperfusion due to acute internal carotid or middle cerebral artery occlusions would impair venous drainage. Internal cerebral veins (ICV) drain deep parts of brain, consistently seen on CT angiography (CTA) as parallel vein running close to each other. Minor asymmetric filling can be easily diagnosed. ICV asymmetry on pre-TPA CTA may persist on follow-up CTA in patients who do not achieve recanalisation with TPA. We evaluated whether ICV asymmetry on follow-up CTA can predict the final outcome.

Methods: Consecutive anterior circulation AIS patients treated with IV-TPA were included. ICV asymmetry was assessed in both pre-TPA and follow up CTA. Data were analyzed for the early predictors of function outcome.

Results: Of the total of 1918 AIS patients admitted to our center, 189 (9.9%) were treated with IV-TPA; mean age 64±13 years; 102 (59%) males and median NIHSS 16 points. Hypertension was the commonest vascular risk factor in 144 (76%) and 63 (33%) patients suffered from atrial fibrillation (AF). Overall, 96 (51%) patients achieved good functional outcome (mRS 0-1 at 3 months). ICV asymmetry could be assessed only in 107 (57%) and 74 (39%) patients on their pre-TPA and follow up CTA films, respectively. Increasing age (RR1.02; 95% CI 0.97-1.01, p=0.02), AF (RR 1.38; 95% CI 1.04-1.83, p=0.03), pre-TPA NIHSS (RR per 1-point increase 1.09; 95% CI 1.04-1.16, p=0.01) score and ICV asymmetry on follow up CTA (RR 3.75; 95% CI 2.33-6.06, p<0.0001) were associated with poor outcome at 3 months.

Conclusion: Asymmetry of internal cerebral veins on the follow up CT angiography in acute ischemic stroke patients treated with IV-TPA can be used as an early predictor of poor functional outcome.
Owing to ethnic differences, stroke severity, small number of cases, outcome measures and TPA dose-regimens, it is difficult to compare these studies. In general, the functional outcomes were almost similar (to Japanese studies) when low-dose TPA was used in non-Japanese populations across Asia. Interestingly, with standard-dose IV-TPA regimen, considerably better functional outcomes were observed, without increasing SICH rates.

Conclusions: Variable dose-regimens of IV-TPA are used across Asia without any reliable or established evidence. Recommending low-dose TPA across Asia is difficult as there has never been a head-to-head comparison of variable dose regimens. Perhaps, an Asia-wide randomized controlled trial can address the prevailing confusion about IV-TPA dose.

PP-51
Decompressive craniectomy: an update
A K Jaiswal, R N Sahu, A K Srivastava, S Behari
Sanjay Gandhi Postgraduate Institute of Medical Sciences, Lucknow, India

Background: Decompressive craniectomy is a commonly performed surgical procedure to manage medically refractory brain oedema due to stroke and head injury.

Objective: To study the role of decompressive craniectomy in cases of stroke and head injury

Material and methods: The available literature was reviewed to evaluate the role of decompressive craniectomy in cases of stroke and head injury.

Results: Various class I studies suggested that decompressive craniectomy performed early (preferably within 48 hours of stroke) reduces mortality and morbidity and is associated with favourable functional outcome. In cases of malignant brain edema due to head injury, decompressive craniectomy may be a therapeutic option in appropriate clinical settings.

Conclusions: Class I evidence is available suggesting improved outcome with decompressive craniectomy in cases of stroke while decompressive craniectomy may be useful in appropriate cases.

PP-52
Management of intracerebral haemorrhage in a tertiary care hospital without in situ neurosurgical services
S Bhishman, K D Liyanarachchi, A L L Roshan, S B Gunatilake
Department of Medicine, Faculty of Medical Sciences, University of Sri Jayewardenepura, Sri Lanka

Introduction: A clear consensus has emerged during the last decade for the management of ischaemic stroke. But unfortunately there are no clear guidelines yet for the management of intracerebral haemorrhage (ICH) though there are ongoing clinical trials.

Methods: This is an observational study done on patients admitted to Colombo South Teaching Hospital from March to June 2011 with ICH to study the management patterns of ICH patients by the general physicians.

Results: Twenty six patients were admitted with ICH. There were twenty four ICH (92%), one (4%) brainstem haemorrhage and one intra ventricular haemorrhage (IVH 4%). Nine of the intra cerebral haemorrhages also involved the ventricles. Of the twenty five hemorraghes, eight patients (32%) had mass effect. Twenty patients (80 %) were transferred to the neurosurgical unit at the National Hospital about 10 km away and only two of them underwent surgical evacuation of the hematoma. Of the twenty patients who were referred to neurosurgical unit only five had a mass effect. Three patients with mass effect were not referred to neurosurgical unit because they had a low GCS (3-4), Two had a GCS of 13 and they were not referred and had an excellent outcome. Of the eighteen patients in whom neurosurgical intervention was not done, ten patients died later. The two patients who underwent evacuation showed an improvement of MRS from five to four and five to two respectively. Short term mortality in this group was 52%.

Conclusion: Most of the transfers to neurosurgical treatment seem to be in vain and unnecessary. There appears to be no clear guidelines on when to seek surgical opinion and in this study seems to be based on a reduction in the GCS to between 4 to 13. Local guidelines and availability of neurosurgery services in situ would definitely improve this situation.

PP-53
Predictors of in-hospital mortality in primary intracerebral haemorrhage in rural Malaysia
R M Yousuf1, A R M Fauzi1, A R Jamalludin1, S H How1, M Amran1, T C A Shahrin1, O A Marzuki1, A Shah1
1Department of Internal Medicine, Faculty of Medicine, International Islamic University Malaysia, Malaysia
2Department of Community Medicine, Faculty of Medicine, International Islamic University Malaysia, Malaysia
3Department of Radiology, Faculty of Medicine, International Islamic University Malaysia, Malaysia

Introduction: Primary intracerebral haemorrhage (PICH) remains the deadliest and most disabling form
of stroke. Despite that, there is paucity of epidemiological data on this condition in Malaysia. The aim of our study was to analyse the frequency of various risk factors among our PICH patients and determine the predictors of in-hospital mortality.

Methods: A prospective study conducted among PICH patients at a tertiary care level hospital.

Results: A total of 160 patients (108 male and 52 female) were evaluated. Their ages ranged from 25 to 85 years (mean age was 58.30 ± 11.44 years). Hypertension was the commonest risk factor (74.4%), followed by diabetes mellitus (18.8%) and cigarette smoking (36.3%). The commonest localization of ICH was lobar (43.8%) followed by basal ganglia/thalamus (28.1%) and multilobar (13.1%). The overall mortality was 32.5%. About one third (32.7%) of the deaths occurred within first 24 hours, this rose to 38.5% within first 2 days and 84.6% within one week. The significant independent predictors of acute in-hospital mortality were posterior fossa bleed (OR 11.01; 95% CI 3.21 to 37.81), hematoma volume >60ml (OR 4.72; 95% CI 1.34 to 16.64), mid line shift (OR 3.32; 95% CI 1.05 to 10.50) and intraventricular extension of haemorrhage (OR 5.69; 95% CI 2.24 to 14.47).

Conclusion: PICH is associated with high mortality. The characteristics of haematoma and its localization was the most important factor to determine in-hospital mortality.

PP-54

Decompressive surgery for massive post-traumatic infracts

A Umredkar, S Mohindra, N Varshiney

Department of Neurosurgery, Postgraduate Institute of Medical Education and Research, Chandigarh, India

Objective: The purpose of this paper is to describe a case series of patients with post-traumatic massive cerebral infarcts who have undergone decompressive surgery due to cerebral swelling.

Materials and Methods: Over a span of 21 months (July 2008 - March 2010), 10 patients underwent decompressive craniectomies for massive brain swelling, in consequence to large cerebral infarcts after head trauma. The outcome of survivors was recorded at a minimum period of 6 months after surgery.

Results: A total of 15303 patients of traumatic brain injury (TBI) were managed in neurosurgical emergency of our trauma centre. There were 3102 patients of severe TBI, having Glasgow Coma Score (GCS) ≤8. As all patients (n = 15303) underwent computerized Tomography (CT) scan of head, 167(1.1%) CT scans revealed arterial infarcts. There were 7 males and 3 females, age range 22 - 48 years, with mean of 32.9 years. Injury-infarct time interval ranged from 8 hours to 16 days, with mean of 90.6 hours. Seventy percent of infarcts were detectable within 3 days after trauma. Post-operatively, 3 patients expired, resulting in mortality rate of 33.3%.

Conclusion: In this case series 50% of subjects reached moderate outcome after decompressive craniectomy for massive cerebral swelling after a post-traumatic infarction. Death was associated with a poor pre-surgical status, which supports an early intervention.

PP-55

Therapy mediated functional changes in descending motor pathway integrity after a chronic stroke

A Bhasin, M V P Srivastava, S S Kumaran, R Bhatia

1Department of Neurology, All India Institute of Medical Sciences, New Delhi, India
2Department of N.M.R., All India Institute of Medical Sciences, New Delhi, India

Introduction: Motor recovery in stroke is dependent on many factors of which the extent of damage to corticospinal tract (CST) is one. Diffusion tensor imaging (DTI) evaluates white matter integrity and it has been found that fractional anisotropy (FA) is reduced in the lesioned cortex. This study correlates the DTI measures of corticospinal motor tracts to the clinical and functional outcomes after stroke.

Methods: Twenty chronic stroke (n=20) patients with the inclusion criteria as 3 months to 2 years of stroke onset; MRC (Medical Research Council) grade of power of wrist and hand muscles of at least 2 were recruited. Eight weeks of motor imagery therapy was administered. DTI was performed with single shot EPI with three b values i.e., 0,400 and 1000 s/mm2, matrix = 128×128 matrix, field of view= 230 mm × 230 mm, TE = 76 ms, TR = 10,726 ms. All patients were followed up at 24 weeks.

Results: The mean radial diffusivity (λr) and axial diffusivity (λa) in the affected hemisphere was 0.40 and 0.30. CST involvement was marked as intact, partial and complete. There was a change of 17.1% in FL ratio between baseline and 8 weeks and 10.01% between 8 and 24 weeks. We observed a change of 28% in the FL ratio between baseline and at follow up (24 weeks). The CST fibre number in the known ROI also increased after physiotherapy regime. A strong correlation was observed with the motor function and FA values.

Conclusion: Motor skill recovery achieved in hemiparetic patients relates to CST involvement. Greater loss in integrity of motor tract is associated with poorer motor outcome in stroke patients. Therapy induced changes correlate well in motor tract recovery after stroke.
Epidemiology and prevention of stroke

**PP-56**

Epidemiology of stroke in patients with rheumatic heart disease: a systematic review

M Liu  
West China Hospital, China

**Background and objective:** Stroke is an important complication after rheumatic heart disease (RHD), but accurate data about its incidence and mortality in RHD patient population is unclear. We performed a systematic review of published studies to assess the incidence and mortality of stroke in patients with RHD.

**Methods:** We searched Ovid Medline, EMBASE, CBM, CNKI and VIP for observational studies reporting the association of stroke and RHD until April 2011. This was supplemented with manual searches. Two authors independently assessed study eligibility. Disagreements were resolved by discussion. We calculated the incidence of stroke per RHD patient-year where possible. We did not do meta-analysis or other statistical calculations that required combining or analyzing data due to methodological heterogeneity and poor quality.

**Results:** We identified 21 eligible studies that involved 26994 participants. Of the 21 studies included, only 1 was a population-based study. The remaining 20 were hospital-based or clinic-based studies. Studies were heterogeneous for the designing and participant characteristics. Two studies reported stroke incidence in RHD patients. It was 4.5% per patient-year in America in 1978 and 5.9% per patient-year in China in 2008. Eight studies reported the rate of stroke in RHD patients’ population. It ranged from 0.37% to 12.6% in Asia in the recent three decades. Ten studies reported the proportion of RHD in stroke patients in recent three decades. The proportion of RHD in patients with ischemic stroke ranged from 3.4% to 23.2% in Asia and 1.8% to 2.0% in Europe and Northern America. Six studies reported the mortality in stroke patients with RHD. It ranged from 8.5% to 47.4% in Asia in recent three decades and it was 49.2% in America in 1951.

**Conclusions:** Stroke incidence due to RHD is not low in Asia, though reliable estimated data cannot be acquired from current studies. Population-based studies with high-quality are needed.

**PP-57**

Cilostazol reduces carotid atherothrombotic plaques in patients with ischaemic stroke during a 6-month follow up

T Nakamura, S Tsuruta, S Uchiyama  
Department of Neurology, Tokyo Women’s Medical University, Japan

**Introduction:** We have previously reported that patients treated with aspirin plus cilostazol during the acute phase of ischaemic stroke had less neurological deterioration than those treated with aspirin alone. However, the mechanisms of this beneficial effect are unknown. Carotid ultrasonography was performed as a sub-study of this randomized trial to investigate the effects of cilostazol on the progression of carotid plaques and intima-media thickness (IMT) during a 6-month follow up.

**Patients and Methods:** This randomized study compared the effects of oral aspirin alone to aspirin plus cilostazol in patients admitted to our hospital because of non-cardioembolic ischemic stroke within 48 h of stroke onset. Maximum IMT within internal and common carotid arteries (max IMT) and plaque score (PS) were examined on admission and 6 months after study entry. No other antithrombotic drugs were administered during the follow up period unless neurological deterioration or stroke recurrence occurred (NIH Stroke Scale score ≥1). Patients with neurological deterioration or stroke recurrence were withdrawn from the study.

**Results:** Seventy-six patients were enrolled in the study and randomly allocated to either group. Sixteen patients in the aspirin group and 26 in the aspirin plus cilostazol group completed the 6-month follow up. Vascular risk factors and usage of antihypertensive or lipid-lowering drugs were not significantly different between the groups. The changes in max IMT had a tendency towards regression in the aspirin plus cilostazol group compared with the aspirin group (-0.23 ± 0.60 vs. 0.10 ±0.53; p = 0.08). The regression in PS was significantly greater in the aspirin plus cilostazol group compared with the aspirin group (-1.02 ± 2.20 vs. 1.00 ± 2.27; p = 0.0068).

**Conclusion:** Treatment with aspirin plus cilostazol compared to treatment with aspirin alone seems to be better in preventing progression of carotid plaques for 6 months after stroke onset.

**PP-58**

Dietary patterns in stroke patients in Northwest India

A Mangat1, D Grewal2, R Singh1, R Jyotsna2, P Kaur2, J D Pandian2

**Epidemiology and prevention of stroke**
1Department of Dietetics, Christian Medical College, Ludhiana, Punjab, India
2Stroke Unit, Department of Neurology, Christian Medical College, Ludhiana, Punjab, India

Introduction: Diet plays a vital role in the prevention and management of stroke. Little is known about the dietary patterns in stroke patients from India and developing countries.

Objectives: 1. To study the dietary patterns in stroke patients. 2. To correlate the dietary patterns with stroke characteristics.

Methods: All first ever stroke patients who gave informed consent were interviewed by the dietician using an oral diet questionnaire between March 2008 and September 2009. The demographic information, type of stroke, risk factors and outcome at one month (modified Rankin Scale [mRs] ≥3 poor outcome) were noted. Statistical analysis was done using SPSS (version 16.0).

Results: A total of 210 stroke patients were enrolled. The mean age was 60.0 ± 14.4 years and majority were men 126 (60%), and 124 (59%) lived in a joint family. One hundred and forty nine (71%) patients had ischaemic stroke; hypertension 167 (79.5%) and diabetes mellitus 87 (41.4%) were the common risk factors. Out of 210 stroke patients, 168 (80%) were vegetarians and 42 (20%) were non-vegetarians. All patients consumed cereals and beverages. The other food items in the diet were as follows; whole milk 203 (96.7%), saturated fats (butter, butter oil, cream) 133 (63.3%), bakery items 139 (66.2%), fried snacks 116 (55.2%), vegetables 207 (98.6%), fruits 96 (45.7%) and juices 20 (9.5%). Patients below 60 years (p=0.02) and with higher education (p=0.03) were more likely to take fried snacks. Patients with hypertension 99 (59.3%) were taking saturated fats (p=0.02). The patients who consumed juices were less likely to have low hemoglobin (p=0.04).

Conclusion: Majority of the patients consumed milk and milk products. Saturated fats were used for preparing fried snacks and bakery items. Fruits and juices were consumed by a small proportion of patients. Our results provide opportunities for stroke prevention by diet modification.

PP-60
Arterial ischaemic stroke (AIS) in adolescents: subtype analysis and neurological impairment

D S Wijesekara, V Ganesan
Neurosciences Unit, Institute of Child Health, University College London, United Kingdom

Introduction: Stroke is an important cause of morbidity and mortality in children who have a distinctive risk factor profile compared with adults. In this study we aimed to describe the subtypes and sequelae of arterial ischaemic stroke (AIS) encountered in adolescents.
**Methodology:** Retrospective analysis of case records and imaging in adolescents (aged 10 to 16 years) referred to the tertiary neurology unit at Great Ormond Street Hospital NHS trust in United Kingdom with AIS over a period of six years. All patients had been investigated for AIS risk factors according to a standard protocol and stroke subtype was categorised using the Paediatric Stroke Classification.

**Results:** Forty two patients, aged 10.0 to 15.6 years (mean 12.88 years) were included; 19 had a prior medical diagnosis while the remainder were previously healthy. Clinical presentation was with unilateral weakness, impaired level of consciousness, focal seizures and headaches. Twenty one had evidence of cerebral or cervical arteriopathy on magnetic resonance imaging/angiography. Non vascular risk factors were identified in 10 and included migraine, cardiac and sickle cell disease. The frequency of different stroke subtypes were as follows: steno occlusive arteriopathy 8, moyamoya syndrome 8, cervical arterial dissection 5, cardio-embolic causes 2, sickle cell disease 1, multiple probable/possible 3, other determined 2, undetermined 13.

Three children died (of critical aortic stenosis, severe SLE and basilar artery occlusion). Of the survivors 18 (46.15%) had a severe residual hemiparesis.

**Conclusions:** AIS leads to significant morbidity in affected adolescents. The risk factor profile in this age group has few overlaps with risk factors for AIS in adulthood. As with younger children, arteriopathy is commonly encountered. However, in this series a relatively high proportion of AIS remained unexplained despite extensive investigations.

**PP-61**

**Do I need to take the rat poison again? Difficult secondary prevention decisions**

**P Boovalingam, L Brawn, O Ormerod**

*John Radcliffe Hospital NHS Trust, Oxford, United Kingdom*

A 78-year old diabetic and hypertensive lady was admitted with left sided headache, dysphasia (both receptive and expressive) and mild right sided upper and lower limb weakness. Past medical history included permanent AF on warfarin, previous TIA, hypercholesterolaemia, previous heart failure, and obstructive sleep apnoea on nasal CPAP. CT head showed 3.5 left temporo-parietal bleed for which she received Beriplex. (INR on admission-3). ECG- Atrial fibrillation (Rate controlled with digoxin and bisoprolol). She made quite an effective recovery apart from proteus urinary tract infection and her speech had improved. However she remains in atrial fibrillation. Cardiac echocardiography showed mild LV systolic dysfunction with left atrial diameter of 5.2 cm (In august 2008-6.38cm). Clearly she is at risk of further embolic stroke and after discussion with an interventional cardiologist, she was successfully fitted with Device occlusion of the left atrial appendage (WATCHMAN device) and discharged home 2 days later.

**Conclusion:** Urgent CT head is of paramount on patients taking warfarin as risk of IC bleed is high even INR is sub-therapeutic. The WATCHMAN Left atrial appendage Technology offers a safe and effective alternative to warfarin in patients with non-valvular atrial fibrillation at risk for stroke.

**PP-62**

**Diurnal variation in the onset of haemorrhagic stroke: National Stroke Registry, Malaysia**

M Neelamegam, I Looi, S N Nazifah, A A Zariah, L M Ong

*Clinical Research Centre, Penang Hospital, Malaysia*

We investigated the diurnal variations in the onset of haemorrhagic strokes to identify any existing patterns and its relationship with gender, age, stroke severity and disability. Data of 214 haemorrhagic stroke cases from January 2010 to December 2010 were obtained from the National Stroke Registry of Malaysia. The data was collected from the 2 participating sites of the registry, Hospital Sultanah Nur Zahirah, Kuala Terengganu, Malaysia and Hospital Seberang Jaya, Malaysia. Onset time was categorized as night (midnight to 6 am), morning (6 am to noon), afternoon (noon to 6 pm) or evening (6 pm to midnight). Stroke severity was measured using the National Institute of Health Stroke Scale (NIHSS). Stroke related disabilities were measured using the Modified Rankin Scale (MRS) and the Barthel Index. There were 213 haemorrhagic stroke cases during the study period. 92.06% were ICH and 7.94% were SAH. There was a significant diurnal variation in haemorrhagic stroke incidence (p<0.001). A high peak was noted in the morning. However, a second lower peak in the afternoon or evening, as noted in past studies, was not evident in this population. No significant difference was noted in the diurnal variation of haemorrhagic strokes according to gender, age groups and location of the stroke. A significant difference in the stroke related disabilities was noted (p<0.05). This study supports the findings of past studies that indicated a higher frequency of haemorrhagic strokes in the mornings. Although stroke related disability is associated with the severity of the event, it is also strongly associated with the time period between the onset of the event and treatment, which can be heavily influenced by the onset time. This could be the possible factor behind the difference in stroke related disabilities in the diurnal groups. Further studies should focus to establish this association.
PP-63

Knowledge of stroke, stroke warning symptoms and stroke risk factors amongst general practice physicians in Sri Lanka

T Chang, S Ibrahim, C Arambepola
Department of Clinical Medicine, University of Colombo, Sri Lanka

Objectives: Stroke is a leading cause of death and disability. First-contact care remains one of the most effective strategies in reducing its burden. This study aimed to assess the knowledge, warning symptoms, risk factors and treatment of stroke amongst General Practitioners (GPs) in Sri Lanka.

Methods: A pre-tested questionnaire was posted to all GPs on the register of the Ceylon College of General Physicians (n=330). 98 (29.7%) GPs from 13/25 districts in Sri Lanka responded.

Results: Mean age of GPs was 59.6 years (SD=10.3); 78% were males. 81% had a postgraduate qualification. 13% had a personal history of stroke. Thirty-one percent defined stroke correctly. 49% classified stroke as ischaemic or haemorrhagic. 40% identified all and 42% identified 4 out of 5 stroke warning symptoms but 7-11% identified chest pain and breathlessness also as warning symptoms. Majority correctly named stroke risk factors whilst 53% named hypertension as the most important modifiable risk factor. Only 12% defined TIA adequately. 24% correctly specified the stroke risk after a TIA. 39% did not know the concept of a stroke unit but 92% agreed that stroke units reduced mortality and morbidity. Only one-fifth suggested an echocardiogram or carotid duplex after a TIA; 32% felt that a CT scan of brain was not essential in evaluating stroke; 76% would refer all stroke patients for hospital or specialist care; 88% would immediately initiate antiplatelet therapy for hemiparesis and 22% for sudden severe headache. 40% prescribed aspirin alone for ischaemic stroke; 6% combined aspirin with dipyridamole; and 20% prescribed clopidogrel alone. 39% prescribed varying combinations of the three antiplatelet drugs whilst 4% prescribed warfarin. 60% considered thrombolysis effective beyond 4.5 hours after a stroke.

Conclusions: GPs were adequately aware of stroke warning symptoms and risk factors, but knowledge on TIA, investigations, anti-platelet therapy and stroke units needed improvement.

PP-64

Embolic risk of aortic arch atherosclerosis

J Jung, J Y Kwon, J Song, D Kang
Department of Neurology, Asan Medical Center, University of Ulsan College of Medicine, Seoul, Republic of Korea

Background and objective: It is still unclear whether aortic arch atherosclerosis (AAA) is a risk factor of embolic stroke or is an innocent bystander. We hypothesized that ischaemic lesion burden including lesion pattern, number and volume varied in relation to risk stratification of aortic atheroma, if AAA was an embolic source.

Methodology: Of patients admitted to Asan Medical Center between April 2002 and September 2007 with a diagnosis of ischemic stroke, those who had (1) acute ischaemic lesion on diffusion-weighted imaging (DWI) within 5 days of symptom onset, (2) undetermined cause of stroke although extensive work-up, and (3) only AAA detected by transesophageal echocardiography (TEE) were included. AAA was classified as complex (protruding ≥4 mm into the aortic lumen, or any mobile or ulcerative components) vs. simple (<4 mm). Pattern, number and volume of acute ischaemic lesions on baseline diffusion-weighted image (DWI) were analysed. Lesion pattern on DWI was as follows: large territorial vs. perforator vs. pial vs. border-zone.

Results: 82 patients (male 67.6%) were included. 34 patients (41.5%) had complex atheroma. They had older age (71.2 ± 10.5 vs. 63.6 ± 10.2, p=0.001) and higher level of homocysteine (13.7±3.63 vs. 11.7 ± 3.32, p=0.014) than those with simple atheroma. Multiple lesions was significantly associated with complex atheroma group (70.6% vs. 47.9%, p=0.041). Complex atheroma group had higher number of ischemic lesions [median (range), 2 (1 to 42) vs. 1 (1 to 27), p=0.017] and larger log-transformed lesion volume (2.37 ± 1.63 vs. 1.56 ± 1.68, p=0.031) compared with simple atheroma group. Pial infarction was most frequently observed. There was no difference in lesion pattern between the two groups.

Conclusion: Lesion burden in AAA was different according to embolic risk stratified by TEE, suggesting stroke mechanism of AAA is distal embolization.

PP-65

Superficial temporal artery - middle cerebral artery bypass in patients with severe steno-occlusive disease of intracranial carotid and middle cerebral artery

P K Loh, K W P Ng, C Ning, A K Sinha, V K Sharma
National University Hospital, Singapore

Background: EC/IC bypass in patients with symptomatic carotid occlusions did not show reduction in risk of stroke recurrence. Subsequent studies found that superficial temporal artery-middle cerebral artery (STA-MCA) bypass could be beneficial in patients with impaired cerebral vasodilatory reserve
(CVR). We evaluated CVR in patients with symptomatic and severe steno-occlusive disease of intracranial carotid (ICA) or MCA and selected patients who could benefit from STA-MCA bypass surgery.

**Methods:** Patients with severe steno-occlusive disease of intracranial ICA or MCA were screened with transcranial Doppler (TCD) for their CVR by using breath-holding index (BHI). Breath-holding index (BHI) <0.69 constituted impaired CVR. Patients with impaired BHI were evaluated with acetazolamide-challenged HMPAO-SPECT imaging. We excluded artery-to-artery embolization by extended TCD monitoring for spontaneous emboli. Patients with significantly impaired metabolic perfusion/CVR on SPECT were offered STA-MCA bypass surgery. CVR was reevaluated in all patients at 6 months and they were followed up for cerebral ischemic events.

**Results:** 112 patients (79 males, mean age 57 yrs; range 23-79yrs) fulfilled our TCD criteria of inadequate CVR. 35 (31 %) patients demonstrated intracranial steal phenomenon (reversed Robin Hood syndrome) with a median steal magnitude of 17% (inter-quartile range, IQR 10). Acetazolamide-challenged SPECT demonstrated impaired CVR in 63 (56%) patients and 39 of them underwent STA-MCA bypass surgery. There were no perioperative complications. TCD and SPECT repeated at 5±2months showed significant improvement in CVR in patients who underwent STA-MCA bypass surgery. During follow up (mean 17months; range 3 to 37months), 34/73 (47%) cases managed with best medical therapy developed cerebral ischemic events. After STA-MCA bypass, only 4 of the 39 (10%) cases developed subsequent events (absolute risk reduction 37%, p=0.002).

**Conclusion:** Symptomatic severe intracranial steno-occlusive disease with impaired CVR carries high risk of cerebral ischaemic events. STA-MCA bypass in carefully selected patients results in significant reduction in stroke recurrence.

**PP-66**

Sufferers of stroke who smoke at baseline are at greater risk of death or non-fatal vascular events

J Kim1, S Gall2, H Dewey1,2,4, R Macdonnell1,5, J Sturm6, A. Thrift1,3

1Department of Medicine, Monash Medical Centre, Southern Clinical School, Monash University, Melbourne, Victoria, Australia
2Menzies Research Institute, University of Tasmania, Hobart, Tasmania, Australia
3National Stroke Research Institute, Austin Health, Heidelberg
4Department of Medicine, University of Melbourne, Victoria, Australia

**Background:** Smoking may exacerbate the risk of death or further vascular events in those with stroke, but data are limited.

**Aim:** To investigate the association between baseline smoking status and the risk of death and non-fatal vascular events over a period of 10 years after stroke.

**Methods:** 1589 cases of first-ever and recurrent stroke were recruited between 1996 and 1999 from a defined geographical region in North East Melbourne. Both hospital and non-hospital cases of stroke were included. Shortly after their stroke, a baseline assessment was undertaken to ascertain smoking behaviour and other risk factors, socio-demographic factors and medical history. Over the following 10 years, all deaths, recurrent stroke events and acute myocardial infarctions that were reported at follow up interviews were validated using medical records. Cox proportional hazards regression was used to assess the association between baseline smoking status (never, ex and current) and death, acute myocardial infarction or recurrent stroke. The model was adjusted for age, sex and socioeconomic status.

**Results:** Sufferers of stroke who were smokers had poorer outcome (Hazard Ratio [HR]: 1.45, 95% Confidence Interval [CI]: 1.17-1.79, p=0.001) when compared to those that had never smoked. Ex-smokers at baseline had a greater risk of recurrent events, but this excess was not statistically different (HR: 1.17, 95% CI: 0.97-1.31, p=0.111). When this analysis was limited to 28 day survivors of stroke, current smokers (HR: 1.56, 95% CI: 1.24-1.96, p<0.001) and ex-smokers (HR: 1.22, 95% CI: 1.04-1.43, p=0.015) at baseline had poorer outcome than those who had never smoked. Current smokers had poorer outcome when compared to past smokers (χ2=15.83, p<0.001).

**Conclusions:** The observation that sufferers of stroke who were current smokers had a greater risk of recurrent vascular events than ex-smokers demonstrates clear benefits of smoking cessation.

**PP-67**

Can current stroke incidence rates be estimated from national hospital and mortality data? An example from the North East Melbourne Stroke Incidence Study (NEMESIS)

D A Cadilha1,2, T Vos1, A G Thrift1

1Stroke and Ageing Research Centre, Monash Medical Centre, Southern Clinical School, Monash University, Melbourne, Australia

**Background:** To investigate the association between baseline smoking status and the risk of death and non-fatal vascular events over a period of 10 years after stroke.

**Methods:** 1589 cases of first-ever and recurrent stroke were recruited between 1996 and 1999 from a defined geographical region in North East Melbourne. Both hospital and non-hospital cases of stroke were included. Shortly after their stroke, a baseline assessment was undertaken to ascertain smoking behaviour and other risk factors, socio-demographic factors and medical history. Over the following 10 years, all deaths, recurrent stroke events and acute myocardial infarctions that were reported at follow up interviews were validated using medical records. Cox proportional hazards regression was used to assess the association between baseline smoking status (never, ex and current) and death, acute myocardial infarction or recurrent stroke. The model was adjusted for age, sex and socioeconomic status.

**Results:** Sufferers of stroke who were smokers had poorer outcome (Hazard Ratio [HR]: 1.45, 95% Confidence Interval [CI]: 1.17-1.79, p=0.001) when compared to those that had never smoked. Ex-smokers at baseline had a greater risk of recurrent events, but this excess was not statistically different (HR: 1.17, 95% CI: 0.97-1.31, p=0.111). When this analysis was limited to 28 day survivors of stroke, current smokers (HR: 1.56, 95% CI: 1.24-1.96, p<0.001) and ex-smokers (HR: 1.22, 95% CI: 1.04-1.43, p=0.015) at baseline had poorer outcome than those who had never smoked. Current smokers had poorer outcome when compared to past smokers (χ2=15.83, p<0.001).

**Conclusions:** The observation that sufferers of stroke who were current smokers had a greater risk of recurrent vascular events than ex-smokers demonstrates clear benefits of smoking cessation.
Background: Planning of health services for stroke requires robust projections of the annual number of strokes. Estimates of strokes occurrences in Australia are currently obtained by multiplying age-specific incidence rates of stroke from the North East Melbourne Stroke Incidence Study (NEMESIS) to the known population in these same age bands. There is some concern that these figures may overestimate stroke events because national data for hospital separations provide evidence that stroke hospitalisations declined by 2.15% per year from 1996-7 to 2005-06. NEMESIS incidence data were originally obtained between 1996 and 1999 and may be out-dated.

Aims: To assess the potential for overestimation of stroke numbers in Australia.

Methods: Hospital separations data and two different stroke projection models were compared. Both models (unadjusted-NEMESIS and adjusted-NEMESIS) were based on age- and sex-specific attack rates from NEMESIS applied to the 2003 population. In the adjusted model the ratio of NEMESIS incidence to hospital separation rate in the same year for ICD-9 430-438 (primary diagnosis) was multiplied by the 2002/2003 hospital separation rate for ICD-10 I60-69 (primary diagnosis). First-ever events were assumed to represent 70% of the total and then 89% were considered hospitalised. To compare with the unadjusted model we therefore divided by 70% (proportion of first-ever events) and multiplied by 89% (proportion hospitalised).

Results: In 2003, government data on Australian hospitalisations for stroke were 40,249. Applying unadjusted 1998 NEMESIS rates, to the 2003 population 47,463 hospitalised strokes were projected. This contrasts to the adjusted model, where approximately 27,971 stroke hospitalisations for stroke events were estimated.

Conclusions: Hospital separations data provide reasonable evidence of declining stroke occurrences. Since no new community-based incidence data are available for Australia, better modeling of currently available data will improve our estimates of stroke occurrences. This will enable better planning of health services for stroke.

PP-68

Are there inter-ethnic differences in stroke incidence in Asia?

N Venketasubramanian1,2, B C Tai2, L C S Tan3, S M Saw2

1Division of Neurology, University Medicine Cluster, National University of Singapore, Singapore
2Department of Epidemiology and Public Health, National University of Singapore, Singapore
3Department of Neurology, National Neuroscience Institute, Singapore

Introduction: Stroke incidence studies in ‘Western’ populations showed higher risk among some ethnicities.

Objectives: This study was performed to determine stroke incidence in a multi-ethnic Asian population.

Methodology: The Stroke, Parkinson’s disease, Epilepsy and Dementia in Singapore (SPEDDS) study was a tri-ethnic community-based prevalence survey of neurological diseases among 14906 randomly-selected Singaporeans aged above 50yr. A self-report of vascular risk factors was obtained at baseline. Subjects stroke-free at baseline were telephoned 4 years later and asked if they had had a stroke. Medical records of non-respondents and those who answered affirmatively were retrieved. Stroke was sub-typed into ischaemic(IS), hemorrhagic(ICH), subarachnoid(SAH) and unknown(UNK) based on neuroimaging. Data was analysed using SPSSv17.0.

Results: At baseline, 606 had had a stroke, yielding a study population of 14300; 59.6% Chinese, 20.7% Malay, 19.7% Indian; mean age 63.1yr(+9.0), 55.2% female, 34.1% had hypertension(HT), 21.2% hyperlipidaemia(HL), 18.1% diabetes(DM), 9.4% heart disease(HD), 26.6% ever smoked(SM), 10.8% family history of stroke(FH). 125 developed incident stroke: crude rate 220/100000/yr, (0.87%, 95%CI 0.72-1.02), 0.96% among Malays, 0.94% Chinese, 0.64% Indians. IS comprised 82.4%, ICH 13.6%, SAH 3.2%. On univariate analysis, stroke was significantly associated with increasing age, HT, DM, HD, SM, but not gender, ethnicity, HL, FH. On multi-variate analysis, significant association remained only for age(OR 1.08, 95%CI 1.0-1.1), DM(OR 1.86 95%CI 1.24-2.79), HT(OR 1.75, 95%CI 1.20-2.55).

Conclusions and recommendations: Stroke incidence among Singaporeans is consistent with studies elsewhere. There are no inter-ethnic differences. More studies in multi-ethnic Asian populations are needed.

PP-69

Prevalence of vascular dementia among Asians

N Venketasubramanian1,2, S M Saw2, L C S Tan3, J J Chin3, S Sahadevan1

1Division of Neurology, University Medicine Cluster, National University of Singapore

Introduction: Vascular dementia (VD) is the second most common form of dementia, second only to Alzheimer’s disease. The prevalence and incidence of VD are higher in Asia compared to Western studies, and usually higher in the elderly. In Asian populations, a high prevalence of stroke and hypotension is common, and hence the risk of VD is high.

Methods: The Stroke, Parkinson’s disease, Epilepsy and Dementia in Singapore (SPEDDS) study was a tri-ethnic community-based prevalence survey of neurological diseases among 14906 randomly-selected Singaporeans aged above 50yr. A self-report of vascular risk factors was obtained at baseline. Subjects stroke-free at baseline were telephoned 4 years later and asked if they had had a stroke. Medical records of non-respondents and those who answered affirmatively were retrieved. Subjects with no history of previous stroke and no stroke-like symptoms were included. VD was diagnosed using DSM-IV criteria.

Results: At baseline, 606 had had a stroke, yielding a study population of 14300; 59.6% Chinese, 20.7% Malay, 19.7% Indian; mean age 63.1yr(+9.0), 55.2% female, 34.1% had hypertension(HT), 21.2% hyperlipidaemia(HL), 18.1% diabetes(DM), 9.4% heart disease(HD), 26.6% ever smoked(SM), 10.8% family history of stroke(FH). 125 developed incident stroke: crude rate 220/100000/yr, (0.87%, 95%CI 0.72-1.02), 0.96% among Malays, 0.94% Chinese, 0.64% Indians. IS comprised 82.4%, ICH 13.6%, SAH 3.2%. On univariate analysis, stroke was significantly associated with increasing age, HT, DM, HD, SM, but not gender, ethnicity, HL, FH. On multi-variate analysis, significant association remained only for age(OR 1.08, 95%CI 1.0-1.1), DM(OR 1.86 95%CI 1.24-2.79), HT(OR 1.75, 95%CI 1.20-2.55).

Conclusions and recommendations: Stroke incidence among Singaporeans is consistent with studies elsewhere. There are no inter-ethnic differences. More studies in multi-ethnic Asian populations are needed.
Aim: This study was performed to determine the prevalence of VD in a multi-ethnic Asian population.

Methods: The community-based Stroke, Parkinson's Disease, Epilepsy and Dementia in Singapore (SPEEDS) Study randomly recruited adults aged >50 years. They were screened for cognitive impairment using the Abbreviated Mental Test or a self-report of progressive forgetfulness. Those who screened positive were assessed for dementia by DSM-IV criteria. Subjects were also screened for stroke using the WHO Protocol for Neurological Diseases, or a self-report of stroke. Those who screened positive were examined for stroke using the WHO definition. Those who met the criteria for both dementia and stroke were diagnosed to have possible VD, as per the NINDS-AIREN criteria. Data was analysed using SPSSv17.0.

Results: 14,819 adults participated, female:male =1.21:1, Chinese:Malays:Indians=3:1:1, median age 62yr(range 50.1-92.6yr). 23.3% had no formal education, 35.0% had > 6yr. Overall VD prevalence was 0.56% (95%CI 0.45-0.70). It was non-significantly higher in males (0.58% vs 0.54%, p=0.27), rose with increasing age(p<0.001), fell with increasing education(p=0.047). It was non-significantly higher among Indians (0.87%, 95%CI 0.54-1.38) compared to Chinese (0.55%, 95%CI 0.42-0.72) and Malays(0.52%, 95%CI 0.30-0.92), p=0.12. After adjusting for age, gender and education, compared to Chinese, the odds of dementia was 2.19(95%CI 1.24-3.85, p=0.007) among Indians, and 1.45(95%CI 0.83-2.55, p=0.19) among Malays.

Conclusions: VD prevalence among older Singapore adults is 0.56%. It rises with age, falls with education. It is more prevalent among Indians compared to Chinese and Malays. The reasons for these differences need further study.

PP-70

Public awareness of stroke, its warning symptoms, risk factors and treatment in Sri Lanka

T Chang, S Ibrahim, C Arambepola, H M Ranasinghe, A H T M Mihirini, D Weerasinghe, T D P Vithanage, C Maithripala

Department of Clinical Medicine, University of Colombo, Sri Lanka

Objectives: Awareness of stroke is pivotal in reducing its burden. We evaluated knowledge on stroke, its warning symptoms, risk factors and treatment amongst general public.

Methods: Relatives of non-stroke-patients admitted to medical wards of the National Hospital of Sri Lanka who did not have a personal or first-degree family history of stroke/TIA, were selected using random-systematic-sampling. Pre-intern doctors interviewed them using a pre-tested questionnaire.

Results: Eight hundred and forty individuals (51.7% males; mean age 40.7 years; SD=12.8) from 21 of 25 districts in Sri Lanka were interviewed; 52.2% were educated Ordinary levels; 62.7% were employed; 60.6% earned >Rs 10,000/month; and 48.3% had 1 vascular risk factors. Four hundred and forty seven respondents (53.2%) did not know that the brain was affected in stroke. Only about a third knew that stroke could be caused by an occlusion or rupture of a brain blood vessel. In the logistic regression analysis, age <40 years (p<0.02; adjusted OR 1.48; 95% CI: 1.09, 2.01), lower income (p<0.001; 1.94; 1.43, 2.64) and lower education (p<0.001; 2.06; 1.50, 2.83) were associated with a lower knowledge of the organ affected and the mechanisms of stroke. Over 90% of respondents correctly identified 3 stroke warning symptoms and 3 stroke risk factors. Although 84.6% would seek immediate western medical treatment following a stroke warning symptom, 52.9% believed that indigenous medicine was the best treatment for stroke. 44.2% were not sure whether stroke was preventable whilst 80.1% did not know that aspirin could prevent stroke. Fifty seven percent had learnt about stroke from friends/relatives and 45.3% from television, but only 7.8% had received information from medical staff.

Conclusions: Public awareness of stroke warning symptoms and risk factors was adequate but knowledge on stroke mechanisms, treatment and prevention was lacking.

PP-71

Determinants of adherence to Stroke Key Performance Indicator (KPI) in Malaysia

I K Azmi, S N Nazifah, I Irene, A A Zariah, M R Hanip

Hospital Sultanah Nur Zahirah, Terengganu, Malaysia

Background and purpose: The Malaysia National Stroke Registry (NSR) was initiated in 2009 incorporates nine performance measures based on US Paul Coverdell National Acute Stroke Registry (PCNASR) stroke performance measures. The quality of ischemic stroke care in our hospital was evaluated using this performance measures.

Method: Data from Malaysia NSR for Hospital Sultanah Nur Zahirah, Terengganu and Hospital
Seberang Jaya, Penang between January 2010 and December 2010, was used to assess adherence to this nine performance measures of care. Our performance was then compared with data from PCNASR surveillance for 2009 since the data for 2010 is not yet available.

Results: A total of 712 admissions for acute ischaemic stroke patients were registered. Adherence to acute ischemic stroke care measures as compared to PCNASR were as follows: venous thromboembolism prophylaxis (VTE)( 38.6% vs 93.0% ), discharged on antithrombotic therapy (84.4% vs 98.0%), anticoagulation therapy for atrial fibrillation (AF)( 39.4% vs 87.0%), antithrombotic therapy within 48 hours of admission (85.1% vs 96.0%), discharged on statin medication (85.8% vs 88.0%), dysphagia screening (83.0% vs 73.0%), stroke education (75.7% vs 97.0%). Performance measures of thrombolytic therapy administered was not included as there is no provision of such facility in the participating hospitals.

Conclusion: Stroke performance measures that were incorporated in Malaysian NSR are useful tool for assessing and improving quality of stroke care. Adherence to acute stroke performance measures in our country was still unsatisfactory with regard to VTE prophylaxis and anticoagulation therapy for AF.

PP-72

National Stroke Registry: First Report

S N Nazifah¹, I K Azmi¹, I Looi², A A Zariah¹

¹Hospital Sultanah Nur Zahirah, Kuala Terengganu, Terengganu, Malaysia

Introduction: Malaysian National Stroke Registry (NSR) was established in 2009. The main objectives were to evaluate the specified treatment and outcomes, examining factors that influence prognosis and quality of life, and describe the disease patterns relevant to stroke in Malaysia.

Method: A prospective observational study was done from August 2009 until December 2010 in two participating hospitals, using case report form which was then entered in the web application. Data was analyzed descriptively using SPSS 17.

Results: During the period, 1018 patients were registered with a mean age of 62.59 ± 11.91 years and 54.3% were males. Ischemic stroke accounted for 73.3%of cases, followed by Intracerebral Haemorrhage (ICH 20.6%), Transient Ischemic Attack (TIA 4.4%) and subarachnoid haemorrhage (SAH 1.7%). Of all ischemic strokes, partial anterior circulation infarct (PAC) showed the highest percentage, 43.4 %. The most common risk factor was hypertension (75.5 %). Other risk factors were diabetes mellitus (DM), previous stroke or TIA, hyperlipidaemia and active smoker, 45.6%, 25.1%, 22.4%, 19.4%, respectively. The median length of stay was 3 days and of total, 68.0% of patients need rehabilitation. In this period, there was mortality of 11.1% with massive cerebral bleed being the main cause.

Conclusion: NSR is a useful tool for the study of risk factors, disease patterns and outcomes in our population. However, further expansion of this registry is required for more comprehensive stroke database.
# First Author Index – Oral Presentations

<table>
<thead>
<tr>
<th>Name</th>
<th>Page Numbers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ahn S V</td>
<td>OP-4</td>
</tr>
<tr>
<td>Chang T</td>
<td>OP-14</td>
</tr>
<tr>
<td>Collas D</td>
<td>OP-7</td>
</tr>
<tr>
<td>Dong W</td>
<td>OP-13</td>
</tr>
<tr>
<td>Gunawardhana S A C U</td>
<td>OP-3</td>
</tr>
<tr>
<td>Holliday E G</td>
<td>OP-5</td>
</tr>
<tr>
<td>Khan M</td>
<td>OP-12</td>
</tr>
<tr>
<td>Li J</td>
<td>OP-2</td>
</tr>
<tr>
<td>Loh P K</td>
<td>OP-8</td>
</tr>
<tr>
<td>Ng K W P</td>
<td>OP-9</td>
</tr>
<tr>
<td>Park J</td>
<td>OP-1</td>
</tr>
<tr>
<td>Ranawaka U K</td>
<td>OP-11</td>
</tr>
<tr>
<td>Skoloudik D</td>
<td>OP-6</td>
</tr>
<tr>
<td>Somarathna S C</td>
<td>OP-15</td>
</tr>
<tr>
<td>Wu B</td>
<td>OP-10</td>
</tr>
</tbody>
</table>

# First Author Index – Poster Presentations

<table>
<thead>
<tr>
<th>Name</th>
<th>Page Numbers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arasalingam A</td>
<td>PP-26, PP-27</td>
</tr>
<tr>
<td>Azmi I K</td>
<td>PP-71</td>
</tr>
<tr>
<td>Bhasin A</td>
<td>PP-55</td>
</tr>
<tr>
<td>Bhishman S</td>
<td>PP-52</td>
</tr>
<tr>
<td>Boovalingam P</td>
<td>PP-10</td>
</tr>
<tr>
<td>Boovalingam P</td>
<td>PP-61</td>
</tr>
<tr>
<td>Cadilhac D A</td>
<td>PP-67</td>
</tr>
<tr>
<td>Campbell B C V</td>
<td>PP-32</td>
</tr>
<tr>
<td>Chang T</td>
<td>PP-63, PP-70</td>
</tr>
<tr>
<td>Chhabra R</td>
<td>PP-31</td>
</tr>
<tr>
<td>Coughlan T</td>
<td>PP-16</td>
</tr>
<tr>
<td>Dikanovic M</td>
<td>PP-5</td>
</tr>
<tr>
<td>Do Y</td>
<td>PP-9</td>
</tr>
<tr>
<td>Dong W</td>
<td>PP-39</td>
</tr>
<tr>
<td>Du W</td>
<td>PP-17</td>
</tr>
<tr>
<td>Gange N H</td>
<td>PP-36</td>
</tr>
<tr>
<td>Gunawardhana S A C U</td>
<td>PP-45, PP-46</td>
</tr>
<tr>
<td>Halley S A</td>
<td>PP-11</td>
</tr>
<tr>
<td>Harris S</td>
<td>PP-2, PP 3</td>
</tr>
<tr>
<td>Herzig R</td>
<td>PP-7</td>
</tr>
<tr>
<td>Jaiswal A K</td>
<td>PP-15, PP 51</td>
</tr>
<tr>
<td>Jayaratne D S D S</td>
<td>PP-47</td>
</tr>
<tr>
<td>Jung J</td>
<td>PP-64</td>
</tr>
<tr>
<td>Kaur P</td>
<td>PP-33</td>
</tr>
<tr>
<td>Kim J</td>
<td>PP-66</td>
</tr>
<tr>
<td>Liu M</td>
<td>PP-6, PP-56</td>
</tr>
<tr>
<td>Loh P K</td>
<td>PP-49, PP-65</td>
</tr>
<tr>
<td>Maharaj J C</td>
<td>PP-59</td>
</tr>
<tr>
<td>Mangat A</td>
<td>PP-58</td>
</tr>
<tr>
<td>Mohindra S</td>
<td>PP-44</td>
</tr>
<tr>
<td>Nakamura T</td>
<td>PP-57</td>
</tr>
<tr>
<td>Nazifah S N</td>
<td>PP-72</td>
</tr>
<tr>
<td>Neelamegam M</td>
<td>PP-62</td>
</tr>
<tr>
<td>Ng K S</td>
<td>PP-38</td>
</tr>
<tr>
<td>Ng K W P</td>
<td>PP-14, PP-50</td>
</tr>
<tr>
<td>Ohta K</td>
<td>PP-40</td>
</tr>
<tr>
<td>Pathirage M</td>
<td>PP-18, PP-19, PP-48</td>
</tr>
<tr>
<td>Name</td>
<td>Pages</td>
</tr>
<tr>
<td>--------------------</td>
<td>------------</td>
</tr>
<tr>
<td>Paudel R</td>
<td>PP-25</td>
</tr>
<tr>
<td>Perera A R</td>
<td>PP-13</td>
</tr>
<tr>
<td>Rha J</td>
<td>PP-41</td>
</tr>
<tr>
<td>Saadatnia M</td>
<td>PP-22, PP-28</td>
</tr>
<tr>
<td>Sahu R N</td>
<td>PP-12</td>
</tr>
<tr>
<td>Sanak D</td>
<td>PP-34, PP-35</td>
</tr>
<tr>
<td>Secades J J</td>
<td>PP-29</td>
</tr>
<tr>
<td>Singla N</td>
<td>PP-4</td>
</tr>
<tr>
<td>Skoloudik D</td>
<td>PP-43</td>
</tr>
<tr>
<td>Srivastava P</td>
<td>PP-30</td>
</tr>
<tr>
<td>Tajmirriahi M</td>
<td>PP-23</td>
</tr>
</tbody>
</table>
Acknowledgements

The Organizing Committee thanks the following companies for supporting the Asia Pacific
Stroke Conference 2011:

**Platinum Sponsors**

Otsuka Pharmaceutical Co. Ltd

State Pharmaceuticals Corporation of Sri Lanka

Zydus

**Gold Sponsors**

Ashland Associates

Torrent Pharmaceuticals Ltd.

**Silver Sponsors**

Euro Asian Pharma (Pvt.) Ltd.

USV

Prizm Medical Inc.

Sun Pharmaceutical Industries Ltd.
Asia Pacific Stroke Conference 2012

Facing Stroke, Message from Asia

September 10–12, 2012
Keio Plaza Hotel, Tokyo, Japan
Chair: Shinichiro Uchiyama

http://www2.convention.co.jp/APSC2012/