Biomechanic aspects in relation to the classification of traumatic brain injury.

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Traumatic Brain Injury (TBI) is the most frequent cause of death in the male population aged between 20 and 35 worldwide.
Direction, force and intensity of impact are key parameters for severity and localization of the brain lesion in TBI patients. Commonly brain injury patients suffer several impacts. For documentation, archiving and for the biomechanical reconstruction of the impact force, the Innsbruck Impact Scheme (IIS), modified after SPATZ is essential. Type I to VI are differentiated.
Based on clinical symptomatology, the neuropathological findings and modern neuroimaging methods supported by biochemical analysis (living pathology — Grcevic), there are three forms of TBI to be differentiated:

1. The linear outer brain trauma (type I, II, III, IV) with lesions of the surface of the brain in the contre coup and coup region
2. The linear inner brain trauma, divided in two forms.
   - The linear inner upper brain trauma (typ Iib, Ia, II) with periventricular lesions (butterfly defect — Grcevic)
   - The linear inner lower brain trauma (type V, Va) with lesions in the upper brainstem and in the surrounding region (Lindenberg)
3. The rotational brain trauma (type IIIa, 111b, IVa, IVb) with intracerebral intracerebral hematoma, delaceration, extracerebral hematoma (Pudenz, Shelden).

From clinical point of view mild, moderate, severe and severest TBI have to be classified.
Regarding histological and the anatomical features there are four well-defined forms of traumatic brain tissue lesions:
Primary brain damages occur in the very moment of the force impact to the brain and is an irreversible lesion.
Sequences of circulatory and metabolic deficits in the penumbra of primary defect causing local tissue damage, hypoxia and/or hypoxemia are responsible for diffuse and regional secondary tissue lesions.
Tertiary lesions developing mostly in a longer posttraumatic course are responsible for encephalopathy, pontine myelinolysis, myelopathy and polyneuropathy, originated by malnutrition, malabsorption, avitaminosis and the bed rest syndrome.
Quartery lesions might emerge months to years after the TBI event in form of hydrocephalus occlusus, meningoencephalitis and brain abscess. As complications contractions of the bigger joints, periarticular ossification, decubitus and lesions of peripheral nerves have to be kept in mind.

In the acute state every patient with a TBI needs exact neurological investigation. Brain edema and intracranial hematoma are most endangering the outcome of TBI patients. The increase the intracranial brain volume results in a tentorial herniation, sometimes followed with foramina) herniation accompanied by an acute mid brain and bulbar brain syndrome (Gerstenbrand, Licking).
In severest conditions a traumatic apallic syndrome may develop (Gerstenbrand). It is important not to miss an accompanying cervical spine injury in cases of spinal cord trauma.

Regardless on the grade of TBI every patient needs acute therapy. The treatment of TBI has to start already on the site of accident. Severest TBI patients have to be transferred immediately to an up-to-date ICU.

Every patient with TBI — regardless of severity — needs a neurorehabilitation program with an individual schedule. A special center with trained personal under the responsibility of a neurologist is necessary. The neurorehabilitation has to start immediately, already in the admitting hospital. A consistent program of modern neurorehabilitation can reduce not only distress and the independency of young patients, it reduces the expenses of the health system to a considerable rate.

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The Seventh World Congress on Brain Injury

Congress of the Portuguese Society
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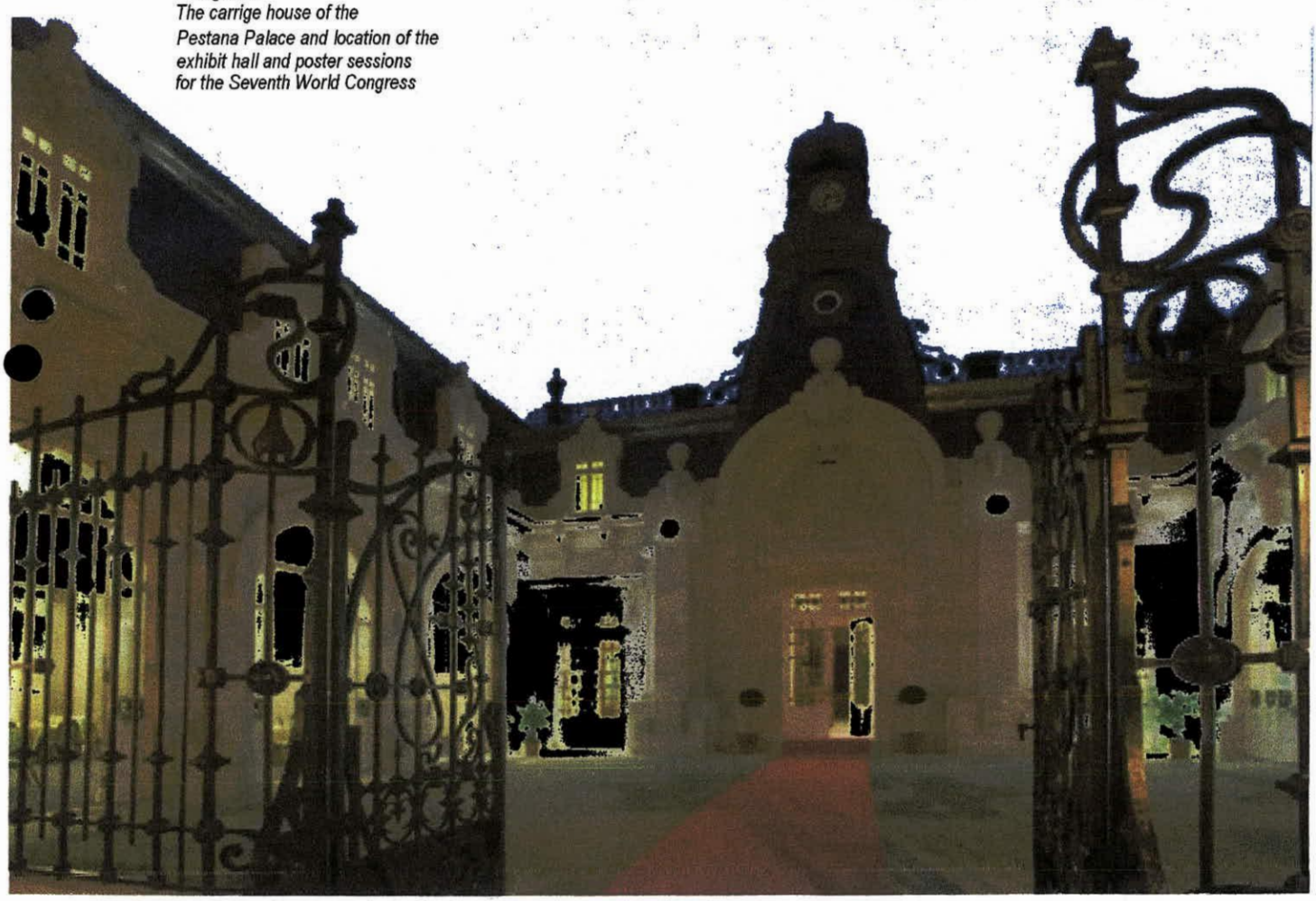
Scientific Programme

Pestana Palace Hotel
Lisbon, Portugal
April 9 - 12, 2008



Foreground
The carrige house of the
Pestana Palace and location of the
exhibit hall and poster sessions
for the Seventh World Congress

Column 1	After Real--in carriage house
Column 2	Belem I
Column 3	Ajuda
Column 4	Belem II

FRIDAY, April 11, 2008

07:30 - 16:00		**Registration Open**			
08:00 - 09:00		**Sunrise Plenary Session Belem I and II** Progress in Neuroprotection: From Bench to Bedside, *John Povlishock, PhD, USA* From PVS to MCS: Fred Plum's Legacy to Neuroethics, *Joseph Finns, MD, USA*			
09:00 - 09:30		**Coffee with Exhibitors, Posters**			
09:30 - 11:00	Exhibits Open	***Free Papers*** **Case Reports** Association Between Visual Disorders And Functional Recovery In Post-Traumatic Children: Evaluation And Treatment Measures (133) *Sandra Strazzer, MD, Italy* Attentional Performance And Its Determinants In Children With Brain Tumours And Normal Controls During The First Year After Diagnosis (291) *Peta Sharples, MD, UK* Cognitive Functioning Over The First Year After Diagnosis In Children Treated For Brain Tumours In Comparison With Matched Normal Controls (290) *Peta Sharples, MD, UK* Biomechanic Aspects In Relation To The Classification Of Traumatic Brain Injury (264) *Walter Struhal, MD, Austria* Botulinum Toxin Type A Treatment Of Lower Limb Spasticity: A Neurophysiological And Clinical Study (270) *Rita Formisano, MD, Italy* Brain Activation And Neuropsychological Changes In Severe TBI Patients After Cognitive Rehabilitation (297) *Rocio Sanchez-Carrion, MSc, Spain*	***Free Papers*** **Clinical Research, Acute and Sub-Acute Rehabilitation** Independence In Instrumental Activities Of Daily Living And Its Relationship To Executive Functions In Persons With TBI (105) *Carolina Bottary, MSc, OT, Canada* Intra-Individual Variability in Recovery From Pediatric Acquired Brain Injury: Relationship to Outcomes at One Year (9) *Danielle Levac, MSc. BSc.PT, Canada* Longing For Everydayness: Implications of Children's Early Experiences Following Moderate to Severe Traumatic Brain Injury in the United States (28) *Cecelia Roscigno, USA* Loss to Follow-Up after Mild Traumatic Brain Injury (mTBI) (237) *Jenny Langley, Master Clinical Nursing, Australia* Multicenter Retrospective Study on Intrathecal Baclofen in Brain Injury (310) *Mauro Zampolini, MD, Italy* The Role of Occupational Therapy in The Rehabilitation of Clinical Syndromes In Patients With Stroke Post-Acute Phase (166) *Tito Filippo Rastelli, MD, Italy* Therapy of Spasticity and Sensorimoto Deficits Following TBI (401) *Prof. Marcela Lippert-Gruener, Czech Republic*	***Free Papers*** **Clinical Research, Acute Care** Incidence And Predictors Of Early And Late Seizures In Children Following Traumatic Brain Injury (TBI) And Factor Predictive of These (183) *Biju A. Hameed, MD, UK* Influence On Proprioception And Cognitive Disorders In The Early Recovery Period Of Heavy Brain Injury (292) *Sergey Zuev. MD, Russia* Management Of Acute SDH ; The Current Scenario (25) *Sandeep Mohindra, MCh, FRCSEd, India* Noxious Cerebral Processing In Severely Brain Damaged Patients: Differences Between The Vegetative And Minimally Conscious State (372) *Steven Laureys, MD, PhD, Belgium* Reasons Behind Missed or Misjudged TBI Diagnosis (40) *Olli Tenovuo, MD, Finland* Relationship between neuroradiological appearances and measures of functional, cognitive and psychological outcome and health related quality of life in children with TBI (181) *Biju A Hameed, MD, UK*	***Free Papers*** **Clinical Research, Post-Acute Care** Motivational Aspects Of Caregiving: The Neuropsychological Feedback And Rehabilitation Make A Difference To Family Caregivers Of Patients With Stroke (26) *Marian Belciug, PhD, Canada* Neurobehavioural Predictors Of Family Functioning And Psychological Distress In Spouses Versus Parents Of Relatives With Severe Traumatic Brain Injury (TBI) In Australia (231) *Malcom Anderson, PhD, Australia* Novel Application Of Topical Anesthetics For Modulation Of Neurogenic Tremor After ABI (111) *Nathan Zasler, MD, USA* Outcomes During The Transition From Hospital To Home For Individuals With ABI And Their Family Caregivers (100) *Benjamin Turner, BSc,, Australia* Pituitary Dysfunction After Traumatic Brain Injury: A New Challenge In Neuro-Endocrinology (309) *Anke van der Eerden, MD, Netherlands* Predictors Of Prognosis Of Functional Recovery From Stroke (148) *Raquel Balmaseda, PhD, Spain* Preparing Of ICF Core Sets For Patients After TBI (402) *Yvona Angerova, MD, Czech Republic*