SIMPOSIO DE CONCIENCIA (C)

C-1

Aspectos controversiales del enfoque encefalocentrista del diagnóstico de la muerte.

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La visión cardiopulmocentrista del diagnóstico de la muerte prevaleció universalmente hasta el surgimiento de las Unidades de Cuidados Intensivos en la segunda mitad del siglo XX, la aparición de nuevas tecnologías hicieron posible las sustitución parcial o total de estas funciones elementales, así se concibió otra visión de la muerte del ser humano a partir de un enfoque encefalocentrista, o sea , teniendo como base el cese irreversible de aquellas funciones del encéfalo que hacen del ser humano un ente viviente, sin embargo el enfoque encefalocentrista sobre el problema de la muerte se conformó con paradigmas que hoy en día son debatidos en el terreno científico; entre ellos están la sostenibilidad de la conciencia para definir el estado de estar muerto, la comprensión del concepto del organismo como un todo, la no universalidad del concepto de muerte la base del encefalocentrismo, la infalibilidad de las pruebas para efectuar este diagnóstico, el divorcio del concepto de estar vivo o muerto según si el ente examinado tenga o no conciencia y la asociación desde sus mismos inicios del enfoque encefalocentrista con la actividad de trasplante de órganos. El presente trabajo pone en debate estos y otros puntos controversiales en el terreno de la neurología relacionándolos con los conceptos biológicos del cese de la vida o la preservación de esta.

C-2

Del estado vegetativo persistente al estado de mínima conciencia. Presentación de una casuística.

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Introducción: Las alteraciones de la conciencia constituyen un verdadero problema de las Neurociencias contemporáneas, dentro de ellas se destacan el estado vegetativo persistente y el estado de mínima conciencia, a pesar de que existen criterios establecidos para algunos autores la frontera entre ambas entidades no está bien definida. Objetivos: Caracterizar ambas entidades, establecer diferencias entre ellas y discutir aspectos bioéticos. Metodología: Se realizó un estudio observacional, descriptivo y longitudinal para precisar diferencias esenciales entre pacientes en estado vegetativo o estado de mínima conciencia que egresaron del Hospital Provincial Clínico Quirúrgico "Saturnino Lora" entre los años 1994 y 2007. Resultados y conclusiones: Se diagnosticaron 37 pacientes que cumplían los criterios de la Multisociety Task Force on Persistent vegetative state y se evaluaron evolutivamente a los 3 meses, a los 6 meses, al año y a los 3 años. Se destaca el traumatismo craneoencefálico con un 77.31% como la causa más frecuente que conllevó al estado vegetativo persistente. A los 3 meses el 81.08% se mantenía con vida y el 8.10% evolucionó al estado de mínima conciencia. A los 6 meses el 40.54% se mantenía con vida y el 29.72% evolucionó al estado de mínima conciencia. Se discuten los resultados según los resultados publicados por la Academia Americana de Neurología en sus Guías de Manejo y por otros autores.

C-3

Induced arousal following zolpidem treatment in a vegetative state after brain injury in 7 cases: Analysis using visual single photon emission computerized tomography and digitized cerebral state monitor.

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Objective: to investigate the effect of zolpidem, an unconventional drug, on inducing arousal in patients in a permanent vegetative state after brain injury using visual single photon emission comput-

erized tomography and digitized cerebral state monitor. Methods: the patients brains were imaged by 99mtc ecd single photon emission computerized tomography prior to treatment with zolpidem [sanofi winthrop industrie, france, code number approved by the state food & drug administration (sfda) j20040033, specification 10 mg per tablet. At 8:00 p.m., 10 mg zolpidem was dissolved with distilled water and administered through a nasogastric tube at 1 hour before and after treatment and 1 week following treatment, respectively. Visual analysis of cerebral perfusion changes in the injured brain regions before and after treatment was performed. Simultaneously, three monitoring parameters were obtained though a cerebral state monitor, which included cerebral state index, electromyographic index, and burst suppression index. Results: all seven patients were included in the final analysis. ① following treatment, the parameters of cerebral state index and electromyographic index were significantly higher than before treatment ($p < 0.05$). The burst suppression index was significantly lower than before treatment ($p < 0.05$). ② cerebral perfusion in areas of brain injury improved significantly in all subjects compared to before treatment. Conclusion: the findings of visual single photon emission computerized tomography and digitized cerebral state monitor reveal that zolpidem appears to be an effective treatment for restoring brain function to certain patients in a permanent vegetative state.

C-5

Quantitative study of the recovery of brain function in acute heavy brain injury patients after applying Xingnaojing injecta in early age.

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Objective: to investigate the clinical value of applying xingnaojing injecta in early age (<24h) in improving brain function and prognosis for acute heavy brain injured patients. Methods: all patients were divided into two groups randomly, xnj group and control group. The treatments of xnj group are the same as control group except using the drug. All patients' brains were monitored by a cerebral state monitor (csm) in 24 hours before treatment and the 3 days, 7 days, 14 days after. Simultaneously, glasgow-pittsburgh coma scores were obtained by at least two doctors. Results: the csi and glasgow-pittsburgh coma scores were slightly declined in early 3 days and there was no significant difference between the change in two groups($p>0.05$). Three days later the two indices improved in two groups and xnj group were much higher than control group ($p<0.05$). Conclusion: early xnj intervention could reduce brain injury in early stage and it was in favor of restoring brain function and improving prognosis for acute heavy brain injured patients.

C-6

Quantitive evaluation and indication of zolpidem treatment for arousing patients in coma after brain injury

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Objective: to investigate the effect and indication of zolpidem, an unconventional drug, on inducing arousal in unconscious patients after brain injury using visual single photon emission computerized tomography and digitized cerebral state monitor. Methods: all patients were divided into four groups according to brain damage areas and mechanism. All patients' brains were imaged by 99mtc ecd single photon emission computerized tomography before and 1 hour after treatment with zolpidem 10mg through a nasogastric tube. Simultaneously, quantitative parameters were obtained though a cerebral state monitor(csm). The patients who received one-week treatment would be monitored again using csm and be compared with the first time using the drug. Results: ①the csi and bs in group a and c showed great difference ($p < 0.01$) before and after treatment while there was no statistic difference in group b and d.. ② cerebral perfusion in areas of brain injury improved significantly in group a and c after medicine. The change was not obvious in group b and d. ③after one week treatment, all parameters obtained from csm had no statistic difference compared with the first

time using medicine. Conclusion: zolpidem appears to be an effective medicine for restoring brain function to certain coma patients especially for cases whose brain injuries are mainly in non-brain stem areas. The improvement of brain function is "suddenly", not "gradually", like an "on-off" mechanism.

C-7

Induced arousal following zolpidem treatment in a vegetative state after brain injury in 7 cases: Analysis using visual single photon emission computerized tomography and digitized cerebral state monitor.

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Objective: to investigate the effect of zolpidem, an unconventional drug, on inducing arousal in patients in a permanent vegetative state after brain injury using visual single photon emission computerized tomography and digitized cerebral state monitor.methods: the patients brains were imaged by 99mtc ecd single photon emission computerized tomography prior to treatment with zolpidem [sanofi winthrop industrie, france, code number approved by the state food & drug administration (sfda) j20040033, specification 10 mg per tablet. At 8:00 p.m., 10 mg zolpidem was dissolved with distilled water and administered through a nasogastric tube at 1 hour before and after treatment and 1 week following treatment, respectively. Visual analysis of cerebral perfusion changes in the injured brain regions before and after treatment was performed. Simultaneously, three monitoring parameters were obtained though a cerebral state monitor, which included cerebral state index, electromyographic index, and burst suppression index. Results: all seven patients were included in the final analysis. ① following treatment, the parameters of cerebral state index and electromyographic index were significantly higher than before treatment ($p < 0.05$). The burst suppression index was significantly lower than before treatment ($p < 0.05$). ② cerebral perfusion in areas of brain injury improved significantly in all subjects compared to before treatment. Conclusion: the findings of visual single photon emission computerized tomography and digitized cerebral state monitor reveal that zolpidem appears to be an effective treatment for restoring brain function to certain patients in a permanent vegetative state.

C-8

***Unresponsive Wakefulness Syndrome* (*UWS*)-Proposal for a New Terminology of Apallic Syndrome / Vegative State:**

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As a result of modern emergency intensive care treatment, diagnostic neuroimaging, and sophisticated nursing many individuals who would have died in the past do increasingly survive from severe brain damage. This, however, is at the expense of severest impairments of higher brain functioning and disabilities causing specific behavioural signs and symptoms that are known as an *Apallic Syndrome* (AS), a term still used in Central and East Europe and Asia, respectively as a *Vegetative Sate* (VS) in the UK, US and in the English literature (1-5). Full state AS/VS could be present either as a remission defect or an irreversible end stage. For Europe the prevalence of AS/ VS in hospital cases is reported to be 0.5–2/100.000 population/year. One quarter to one-third is caused by traumatic brain damage. Roughly 70% are non-traumatic brain lesions (e.g. due to intracranial haemorrhages, tumours, cerebral hypoxemia following cardiac arrest (with an increasing frequency!) and chronic neurological diseases (e.g. Mb.Alzheimer, Parkinsons D.) Full stage AS / VS is clinically defined in three domains (a) anatomy, (b) behaviour, and (c) consciousness (self-awareness). The term apallic syndrome was coined by Kretschmer to describe patients *who are awake but unresponsive* secondary to severe brain damage. AS is the clinical manifestation of a *functional multi modular disconnection syndrome* characterized by signs and symptoms of a *pathological neurobehavioral syndrome .* Apallic cannot be explained by or taken for a conditio sine qua non of an anatomically completed and

permanent disconnection of neocortical structures and higher cerebral functioning as previously suspected by Kretschmer, when he coined the term "a*pallic"* from the Latin pallium which in English means overcoat (pallium) since functional remission could be possible. "*Vegetative*" State, first introduced as persistent VS by Jennett and Plum must not be permanent *persistent* . The name "*vegetative* " was chosen to refer to the preserved vegetative (autonomous) nervous functioning despite major concerns and ongoing controversy over the meaning and connotation of *vegetative* nomenclature. The purpose of this contribution is to recommend a new nomenclature for an old pathological behavioural syndrome as to enable scientists and clinicians to assess all stages accurately regarding neuro-physiology, neuropathology, quality management, prognosis, and ethics. At the European Workshop the international Task Force on the Vegetative State proposed *Unresponsive Wakefulness Syndrome (UWS)* as the novel terminology to replace AS/VS in Rome,18.9.09.

C-8

***Coma Remission Scale (CRS)*. Clinical assessment of patients emerging from posttraumatic coma and Apallic Syndrome/ Vegetative State.**

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Objective: Increasingly more patients survive after severe traumatic brain damage, in many cases, however, suffering from severe impairments and disability. Early neurological- neurosurgical rehabilitation (EENR) is a special rehabilitation concept for patients after acute brain damage that aims to preserve and to restore brain plasticity and higher cortical functioning in the early stage at the begin of holistic neurorehabilitation. ENNR needs a multidisciplinary approach for special care and support of impaired higher brain functioning and prevention from frequent early complications. The German Coma Remission Scale, *CRS*, aims at assessment of restoration of impaired brain functioning. *Methods:* Impairments refer to loss of structures and functions, disabilities to limitations and participating restrictions. Functioning is an umbrella term encompassing all body functions, activities and social participation (WHO-ICF 2001).Functional inadequacy of both the Glasgow Coma Scale, *GCS* (Teasdale and Jennett,1974) and the Glasgow Outcome Scale *GOS* (Jennett and Bond,1975) are an ongoing matter of debate and in spite of everything they became worldwide accepted. The German Task Force on ENNR has worked out its *CRS* was by adding up the 15 points GCS score for *neurobehavioral functioning* as they are arousability/ attention, motor and sensible responses. All together six items have to be assessed carefully will need less than 15 minutes after training): 1.Aurousability/ attention (max. 5 pts) to any stimulus; 2. Motor response (max 6); 3. Response to acoustic stimuli (max 3); 4. Response to visual stimuli (max 4); 5. Response to tactile stimuli (max 3); 6. Rsponse to speech-motor (logomotor) response (max 6) The maximal attainable score is 24 points, 24 points became the cut off point of ENNR, in Germany that is equal to > 40 points of the Early Rehabilitation Barthel which is commenly used in Germany besides the Functional Independent Measure, FIM. Minimally conscious state, MCS (Giagcino et al 1997) describes higher cortical functioning of patients who regained consciousness to a certain extent but who are otherwise unable to initiate purposeful behaviour or communicate intelligibly while emerging from coma and full stage apallic syndrome (AS)/ vegetative state(VS). *Results*:.The CRS was first published in Germany for assessment of functional recovery from coma and/ or AS/VS full stage and remission stages in 1993 (1). An English version is available (2,5). CRS is successfully used in the German speaking European countries during ENNR in addition to other functional scoring systems. The best CRS sum score, as assessed routinely by the team members, reflects the patient's best functional performance including neuropsychological/ neurobehavioral functioning at a given time. Its practicability, efficacy, and reliability has been demonstrated by different groups. In analyzing prospectively the late outcome of 270 adult individuals following TBI and ENNR up to fife years, median 2 ½ years, we could show that no patient with CRS less than 20 points on day 40 achieved a final GOS of 4 or 5, and all patients with CRS less than 10 points remained GOS 2 or died, while in contrary all patients CRS 24 at day 40 recovered to GOS 4 or 5. *Conclusion*: Fifteen years practical experience from thousands of patients has demonstrated CRS as an efficient and reliable measuring tool for assessment of early restoration of higher cerebral

functioning after TBI. CRS can be used by all team members following the simply described instructions for all 6 items. Neurobehavioral-neuropsychological performance is well reflected .The (best) CRS sum score , which is assessed over time, can be of a prognostic value after 40 days following the acute brain damage.

C-9

Early Rehabilitation in Neurosurgery after Acute Brain Lesions How to humanize the restoration of personal faculties.

Dr. Klaus R.H. von Wild,
Professor of Neurosurgery, Medical Faculty WW-University of Münster, Münster Germany Objectives: Today, increasingly more patients with brain lesions survive the acute stage, however, suffering from severe impairment of higher cerebral sensory motor and/ or mental cognitive functioning (WHO-ICF). Early neurorehabilitation can significantly improve functioning and patients' reintegration. Methods: Functional rehabilitation is an original task of neurosurgery. Impairments refer to loss of structures and functions. Disabilities refer to limitations or participating restrictions. Functioning is an umbrella term encompassing all body functions, activities and participation. Neurorehabilitation needs a multidisciplinary team approach. We introduced for the first time a new concept of neurosurgical rehab. according to the Guidelines of the German task force. Results: The essential aspect in early rehabilitation is the integration of disciplines and consistent goal setting to regard individual patients' needs. Good structural organization of the team, notice of basic communication rules, conflict management and a definite decision making increase productive interdisciplinary working. The film shows our team approach and the daily work on our special ward that was designed for 20 patients on one floor of 1200 sqm, The early rehab. ward is part of the neurosurgical department. Team leader is the head neurosurgeon who educates and trains also the rotating resident neurosurgeons and the senior residents during weekly rounds. Social reintegration is demonstrated in two patients. Discussion: Obviously the impairment of mental-cognitive and neurobehavioral functioning and not the loss of physical skills will cause patients' loss of life transactions and final outcome. Early neurorehabilitation aims at functional restoration by fostering of the individuals' neural plasticity. Conclusion: Functional rehabilitation is a process whereby patients who suffer from impaired higher cerebral functions following brain injury and cerebral diseases regain their former abilities or, if full recovery is not possible, achieve their optimum physical, mental, social and vocational capacity. It aims at patients' social reintegration. In order to facilitate such goals neurosurgeons should start with a multidisciplinary team approach as early as possible. The have to be educated in rehabilitation to understand the restorative processes and have to learn working in close collaboration with the neuropsychologist and all other members of the team day by day.

C-9

POCD – Delirant State - Controversies In …

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Acronym POCD means: Post-operation consciousness disorders e.g. a consequence of some direct (or indirect?) anesthetic molecule influence upon a nerve correlate of consciousness. In our group of POCD (14 pts - 11 females, 3 males) there were two with attention decline, confused consciousness " e.g. delirant state". W.Z. 35 yrs. old female operated on womb cervical conization in i.v. + inhalant general anesthesia lasting 1 and ¾ hour with consequent rhino-viral nasopharyngitis discovered by CME – expert diagnostic system. By means of the CME encephalo-meningo-cerebellitis with swelling was diagnosed and confirmed by CSF mononuclear pleo-cytosis with EEG intermittent delta activity. Clinic picture: confusion delirant state with hallucinations, illusions, and persecutory delusions completely disappeared after 5 days lasting treatment with 1.0g methylprednisolon i.v. + amantadine sulphate 5x200mg and per oral cortico-therapy since 2x16mg daily tapering to 0 during 10 days. She experienced complete amnesia for the 1st visit, but she is completely restored in EEG, CSF, and behavioral. V.E. 9 yrs old girl; in four years of age tonsillectomy in i. v. + inhalant general anesthesia.

In after-operation time the activation of drug resistant seizure, before under AED sufficient control. Six years later CME shows cerebellum and basal ganglia inflammation. AED ineffective treatment leads to the cortico-therapy per-oral taper lasting 21 days and consequent driven thiopental comatose state with complete consciousness restoration, adequate psychic reaction and behavioral performances. We consider the girl was 5-6 years into the zombie state – permanent obnubilation with EEG epileptic bi-hemispheric discharges. After the cure EEG substantially improved and behavioral is adequate to mild mental retardation. Are there very POCD cases or not? It is a fundamental question!

C-10

Human Consciousness in General Anaesthesia.

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Consciousness is one of the principal properties of the human brain a highly evolved system; it must therefore have a useful function to perform. It is a state that defies definition, but which may involve: thoughts, sensations, perceptions, moods, emotions, feelings, dreams, and an awareness of self, although not necessarily all of these. By Hameroff Consciousness is generally considered to emerge from synaptic computations in microtubules among the brain neurons and are „orchestrated" by neuronal /synaptic inputs (objective reduction-OR) mechanism. Loss of consciousness must not be confused with altered states of consciousness such as anaesthesia, delirium, hypnosis and sleep. Millions people every year undergo general anaesthesia for any surgery with complete and reversible loss of consciousness. During this state consciousness is erased while many nonconscious functions of brain and other organs continue (EEG, evoked potentials). The Bispectral Index (BIS) is a measure of the effects of anaesthesia and sedation on the brain, a new "vital sign" that allows clinicians to deliver anaesthesia with more precision and to assess and respond more appropriately to a patient's changing condition during surgery. The BIS monitor works by monitoring a single channel EEG signal from the patient's frontal lobe. This signal is converted to a number, with 100 being completely awake and with lower numbers representing deeper levels of anaesthesia, It is an important advance in the field of anesthesiology driven by the desire to improve patient care. The scientific general anaesthesia appear to have converged, suggesting the potential for an integrated science.

C-11

Evaluación de la regulación autonómica cardiovascular en pacientes con afectaciones severas de conciencia.

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Introducción. El estudio de la dinámica de la variabilidad de la frecuencia cardiaca (VFC) en pacientes con afectaciones severas de conciencia, coma o muerte encefálica ha sido objeto de estudio en el INN desde 1995. Recientemente, nuestro Grupo ha desarrollado diferentes herramientas de software que hacen posible introducirlas en la práctica neurológica. Objetivo: Presentar las técnicas desarrolladas y mostrar su utilidad para optimizar la evaluación del estado funcional en pacientes con estado vegetativo persistente o muerte encefálica. Metodología: Las técnicas están basadas en el estudio de las series consecutivas de intervalos R-R en los pacientes. Esta información, obtenida del registro simultáneo del EEG y el ECG, mediante el equipo Fénix (Neuronic S.A.), es analizada cuantitativamente off-line en la actual etapa, calculándose indicadores en el dominio del tiempo y de la frecuencia. Resultados: Se aplicaron estos métodos a una paciente en estado vegetativo persistente, durante el registro continuo del EEG y ECG por 90 minutos, después de suministrar un medicamento (Zolpidem), detectándose un efecto activador en el EEG, asociado a incrementos de la actividad simpática cardiovascular. El estudio en una paciente que cumplía con los requisitos establecidos en nuestro país para el diagnóstico de muerte encefálica, mostró aún la existencia de actividad auto-

nómica asociada a la termorregulación y a posible actividad simpática medular durante diez minutos más, antes de que desapareciese todo signo de actividad autonómica cardiovascular. Conclusiones: Los indicadores autonómicos introducidos demostraron resultar específicos y eficientes para la correlación con indicadores conductuales y del EEG en estos tipos de pacientes.

C-12

Autoimmune encephalitis in four girls presenting with psychiatric symptoms.

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Paraneoplastic disorders (PND) are caused by an autoimmune response to a neoplasm. Objective: To describe the clinical presentation, neurobiology, and treatment of a particular type of PND that involves antibodies to the N-Methyl-D-Aspartate receptor (NMDAR). Method: One case of anti-NMDAR mediated encephalitis is presented in detail, along with clinical highlights of 3 other cases seen at our 180-bed hospital within 11 months. Conclusion: NMDAR-antibody mediated encephalitis is of particular interest to child and adult psychiatrists as up to 77% of mostly female patients present with psychiatric symptoms that mimic psychosis, extra-pyramidal symptoms, catatonia and neuroleptic malignant syndrome. Increased awareness of the disorder is important as timely treatment affects outcome.

C-13

Paging Dr. Google: what search engine results tell patients about brain death.

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Objectives: To analyze results from Internet search engine (ISE) inquiries on consciousness and brain death available to self-determining Internet-information seekers grappling with brain death. Methods: Univariate, categorical media content analysis techniques were applied to the top 20 search engine results on Google for keywords "brain death," "brain dead," "brain death criteria," "brain dead criteria," "consciousness, "and "consciousness criteria." Peripheral ads and information were also considered. Result phenotypes were categorized, assessing intended audience and information types. Differential analyses were conducted to assess whether additional terms changed result phenotypes.Results: In total, six ISE inquiries yielded 220 websites, 8 peripheral link ads, 8 official definitions, 40 "web definitions," and 40 suggested "related search" terms. Results ranged from websites from universities and patient advocate groups, to images, to movie or book reviews, to "humor." Top results came from "Wikipedia" from all inquiries except when searching "consciousness criteria." Result phenotype profiles ranged from 4 to 11 per search term result group. Adding "criteria" to search terms increased medical or academic reference results by 78-1,100% and reduced the number of profiles by 30.00-55.56%. The search term "brain dead" returned 75% non-reference and 100% general public results. Conclusions: Search term choice greatly influences result types. From Pew studies, US Internet searches are done most often for information about what a medical provider says, in particular regarding diagnoses, conditions, and symptoms. Therefore, providers using narrowly-focused terms with patients' families regarding brain death or consciousness may guide them to more useful information on the Internet.

C-14

Functional Disconnectivities in Autistic Spectrum Individuals Informs Disorders of Consciousness.

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The neuropathology underlying Autistic Spectrum and neurobehavioral disorders in general most consistently points to dysfunction in cortical-*striatal* pathways leading to inactivation, or insufficient engagement, of *frontal* and *prefrontal lobes*. By implication, there may be functional disconnection between the anterior and posterior higher cortical regions, instead of a fixed dysfunction in either

one. Given this premise, reconnection of these systems via cognitive interventions constitutes a logical remedial approach in the treatment of *ADHD* and neurobehavioral disorders through integrative cognitive and neuropsychological interventions.A fundamental understanding of the nature of functional disconnection syndromes informs a more comprehensive understanding of consciousness, awareness, awake and sleep states that ns, and its clinical impairments. OBJECTIVES:To outline the nature of functional disconnectivities in explaining cognitive neurologically compromised states. METHODOLOGY: Coherence analysis of steady-state and event related EEG activity is compared in individuals with autistic spectrum disorders, persistent vegetative, minimally conscious, relaxed wakeful, and in attentive states. RESULTS: All subjects demonstrated functional disconnectivities but autistic spectrum participants revealed underactive right and overactive left hemisphere activity. Conclusions: Patient's states of consciousness may be effectively studied by indicting the dehree of coherent function or shared electrophysiological activity. The lack of integrated activity is an example of less optimized and less efficiently functioning system. Results are explained employing the Industrial Engineering paradigm of optimization.

C-15

Neurophysiological principles of brain action as a basis for the analysis of EEG signals.

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The aim of present work was to determine efficacy of EEG analysis, which are compatible with two principles of brain functioning- spatial and temporal summation. First one was assessed on the basis of simultaneous multichannel EEG registration in different points of rat brain cortex of both hemispheres with the multiple linear regression analysis of data. It was established that the process of transition from absence to clonic seizure activity, which was provoked through the administration of sodium benzilpenicillin salt in free-moving WAG/Rij rats, was characterized as follows: 1) a preservation of high levels of interaction between brain structures in alpha band; 2) pronounced decrease of interaction in delta and high-frequency rhythm bands; 3) moderate reduction of interaction between brain structures in the theta range. The increase of the number of connections of cerebellar cortex was also marked. Temporal summation principle was assessed with wave- let analysis, which permitted to register and verify dynamical frequency characteristics of signals. Hence, we investigated data collected in the course of learning tests, just for verifying characteristic fragments of EEG similar with their frequency pattern, and wave-let analysis proved to be useful for such an approach. Hence, both principles were compatible with mentioned mathematical methods of EEG analysis and were contributive with regard to identification of proper mechanisms of seizure development.

C-16

Unexplained decreased level of consciousness – a prognostic factor for child abuse in children up to 36 months of age

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Objective. To identify the cases of child abuse and signs of their presentation. To determine the relationship between consciousness and "shaken baby" syndrome in children under three years of age. Methods. We performed a retrospective analysis of children under three years of age, admitted to our clinic during five year period if they met one of the following "high – risk" criteria for child abuse: all children under 12 month of age with any trauma, children under 3 years of age with head trauma or any bone fractures. Physical abuse was determined when injuries were unexplained, unexplainable, implausible or injuries were incompatible with the history given by parents or caregivers. Results. Of 385 patients who met our criteria, 51 (13,2%) were determined to be abused. Abused children were younger than non - abused (mean age 6 vs. 14 months), 38 (74.5%) of them – less than 1 year of age. In 21 (80%) cases "shaken baby" syndrome was stated. Main presenting complaints in "shaken baby" syndromes were as follows: seizures, somnolence or collapse, decreased consciousness, vomiting, episodes of respiratory arrest or cyanosis, indefinite head lump. Retinal hemorrhages

were revealed in 18 (40.0%) cases in the first group and only 2 (0.8%) cases in the second group. Chi-square test showed statistical reliance between child abuse and age, consciousness, respiratory arrest, seizures and retinal hemorrhage ($p < 0.001$) Conclusions. Examining a child less than three years of age with unexplainable respiratory arrest, seizures, decreased level of consciousness everyone should be aware of child abuse.

C-17

Update on the Electrophysiologic Approach to Patients in Anoxic Coma

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Numerous studies have established the value of median somatosensory evoked responses (SSEP) as an early guide in predicting the outcome of patients who have sustained anoxic coma following cardiac arrest. The seminal finding is the bilateral absence of cortical responses always assures the outcome will be unfavorable, with inevitable death without awakening or persistent vegetative state. Recent studies have demonstrated that SSEP in post- cardiac arrest patients treated with hypothermia can also be used to predict unfavorable neurologic outcome. This presentation will review the author's experience using SSEP in anoxic-hypoxic coma and provide an update on the current literature and practice recommendations of the American Academy of Neurology.

C-18

A critique of the apneic-oxygenation test to diagnose “brain death”

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Objective: To determine reliability and safety of the apneic-oxygenation test to diagnose brain death for organ donation. Methods: Review of scientific literature on brain death, apnea testing, radionuclide scintigraphy, organ donation guidelines and application of neurophysiological principles. Results: Hypercarbia with a target $PaCO_2$ of 60 mmHg (8.0 kPa) must be reached before apnea is deemed consistent with brain death in some clinical guidelines while a level of 50 mmHg (6.7 kPa) is required in another. However, the sensitivity and specificity of the test is doubtful because some patients have commenced spontaneous respiration above 60 mmHg (8.0 kPa) and high levels of $PaCO_2$ may cause CO_2 narcosis. Moreover, the test may be harmful if the brain stem is responsive because hypercarbia may also cause intracranial hypertension and contribute to brain damage. If not conducted properly the test may cause hypoxemia or hypotension. Although guidelines for organ donation recommend the test as an essential component of brain death diagnosis, it is often not performed or performed inadequately. Wide variation in conduct of the test has prompted calls for standardization. Conclusions: The apneic-oxygenation test is unreliable to diagnosis of brain death. It is scientifically flawed and hypothesized to cause brain death. In lieu of this test, a reliable test of brain perfusion should be mandatory while the apneic-oxygenation test, if performed at all, should be restricted to demonstration of apnea after brain perfusion has been shown to be absent.

C-19

Cambios metabólicos en el tránsito del estado vegetativo a mínima conciencia evidenciados por Espectroscopía por Resonancia Magnética.

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yM La Espectroscopía por Resonancia Magnética (ERM) ha mostrado su utilidad en la monitorización de cambios bioquímicos en enfermedades metabólicas, traumáticas, infecciosas, etc. En particular la concentración de N-acetil-aspartato (NAA) y Creatina (Cre) se han relacionado con medidas de la integridad neuronal y de los sistemas ependientes de energía, respectivamente. En este trabajo se describen los cambios metabólicos en dos pacientes que evolucionaron desde un estado vegetativo persistente (EVP) a un estado de mínima conciencia (EMC), en comparación con otros dos pacientes que permanecieron en EVP, estudiados de forma seriada mediante ERM. Los espectros de ERM se

obtuvieron en volúmenes de interés (VOIs) de 2x2x2 cm3 en la corteza cerebral del lóbulo frontal izquierdo y en ambos tálamos, y en un volumen 1.5x1.5x3 cm3 en el tallo cerebral. En cada VOI se midió la concentración de NAA y Cre. Para reducir la variabilidad inter e intra-sujetos se analizó el porciento de cambio (PC) de la relación NAA/Cre. La relación NAA/Cre mostró un aumento significativo en la corteza cerebral de los pacientes que evolucionaron de EVP a EMC, mientras que se redujo en los pacientes que permanecieron en EVP. Los cambios en tálamo y tallo cerebral no fueron consistentes con los cambios en el estado cognitivo. Nuestros resultados sugieren que la relación NAA/Cre en la corteza puede ser un criterio válido para evaluar los pacientes que transitan del estado vegetativo persistente a estado de mínima conciencia, aunque su confirmación requiere aumentar la muestra de pacientes. La ERM es una herramienta no invasiva que puede contribuir a la comprensión de los procesos fisiológicos en los pacientes que transitan entre diferentes estados de conciencia.

C-20

Estudio de conectividad de redes cerebrales en pacientes en estado vegetativo persistente utilizando imágenes multimodales de Resonancia Magnética.

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El análisis de la dinámica cerebral que subyace en los procesos de tránsito entre diferentes estados de conciencia, en pacientes con daño cerebral severo, requiere la combinación de información anatómica y funcional procedente de varias fuentes. Este análisis está condicionado por la severa deformación de la anatomía y las conexiones cerebrales, que limitan la aplicación de métodos estándar de procesamiento de imágenes.En este trabajo aplicamos un análisis multiparamétrico para caracterizar la dinámica y morfometría de un paciente, que evolucionó desde un estado vegetativo persistente (EVP) a un estado de mínima conciencia (EMC). Utilizamos un análisis de grafos en imágenes de tensores de difusión (DTI) para el estudio de la conectividad anatómica cerebral. Se obtuvieron imágenes de SPECT y angiografía por RMN (ARM) para evaluar el patrón de flujo sanguíneo cerebral. La localización y caracterización anatómica del daño cerebral se realizó a partir de la segmentación de imágenes de RMN de alta resolución (RMN-3D). La integración de los datos se realizó mediante técnicas de corregistro lineales afines. La combinación de SPECT y ARM mostró la subsistencia de focos de actividad metabólica en regiones frontales localizadas. Las imágenes RMN-3D mostraron la preservación de tejido cerebral en estas regiones. La tractografía por DTI mostró un incremento en la anisotropía fraccional en estas áreas, conectadas a través del Tálamo con regiones posteriores preservadas. Nosotros proponemos que esta restauración de las fibras axonales provee un mecanismo biológico consistente con la evolución cognitiva del paciente. Las imágenes de tensores de difusión, combinadas con otras técnicas de neuroimágenes, representan herramientas poderosas y no invasivas para la medición objetiva de la restauración de las redes neuronales, en pacientes que sufren daño cerebral severo.

C-21

Onset ff Dementia In a Psychotherapeutic Setting: Diagnostic And Neurobiologic Considerations

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We describe the thirteen-year psychotherapy of an extremely bright individual who developed Alzheimer's disease during the course of treatment. The case is noteworthy in that for many years his intellectual capability not only camouflaged his decline, but also the results of norm based cognitive testing, emphasizing the importance of ideographic interpretation. Furthermore, he demonstrated heightened emotional and psychological functioning during middle stages of therapy that initially appeared as clinical improvement rather than mental deterioration. We speculate that this improved ability in therapy reflects disinhibition secondary to cortical dysfunction due to dementia and resultant subcortical affective preponderance in an individual of high intellectual capability.

C-22

The Neural Substrates of Consciousness: Implications for Clinical Psychiatry

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This chapter reviews current perspectives on the neural substrates of consciousness, including a basic functional neuroanatomy and neurodynamics of consciousness, emphasizing concepts about the extended reticular thalamic activating system (ERTAS) and the importance of multiple mesodiencephalic regions for core consciousness, and various thalamocortical regions for extended consciousness. There is also a summary review of basic lesion correlates for major diseases of consciousness, including coma, persistent vegetative state, akinetic mutism, hyperkinetic mutism, and delirium, along with summary heuristics for current and future research. What does consciousness have to do with psychiatry? It is certainly true that we diagnose, conduct a mental status exam and complete a clinical interview, for example, only with patients who are conscious. While our understanding of consciousness is in its infancy and we have much to learn, it is doubtful that any clinician will ever be able to meaningfully provide a neuropsychiatric diagnosis of comatose or sleeping patients. We can imagine how new technologies, such as magnetoencephalography, or functional imaging while performing adaptive tasks, will enable us to observe some of the neural processes (though not the experienced mental contents) in states of dissociation, or mania, or even the excitement of an erotic dream. In each of these examples, such technologies will be drawing the outlines of a working mind. The functional relationship and intimacy between the field of psychiatry and the state of consciousness in the patient has often been taken for granted, but this represents a serious neglect. Psychiatry on the whole has paid little attention to just what consciousness might be, particularly in terms of its neural substrates. Yet the notion of consciousness must be acknowledged as the very epicenter of any concept of mind, such that any deep understanding of the disordering of mind, behavior and emotion central to psychiatric and neuropsychiatric syndromes mandates a deeper understanding of consciousness. From these considerations, there can be little doubt that psychiatry will need to pay increasing systematic attention to consciousness as a foundational process for future progress. If we unravel the neurobiological bases for consciousness, we may discover many new psychiatric treatments, potentially even highly effective therapies we currently could barely imagine.

C-23

Gobal neurodynamics and deep brain stimulation. Appreciating the perspectives of place and process.

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The study of coma and brain death necessarily involve the study of consciousness. A taxonomy of conscious states, and their correlation to the clinical conditions of persistent vegetative state, hyperkinetic mutism, delirium and akinetic mutism is currently lacking (see Watt and Pincus for a preliminary effort).1 The neurobiological mechanisms and processes underlying conscious states are just now becoming better understood, and emerging technologies (electrical, magnetic, and chemical modulation) may help us to better understand the origins of consciousness, as well as enhance the consciousness of severely impaired or comatose patients. It is now generally agreed that consciousness emerges in brains as the result of reentrant and widespread neuronal population behavior. There is not a consciousness button, center, processor, or other metaphorical location that turns-on wakefulness. Distributed models of brain function have overtaken locationist models for many years. Nonetheless, the appeal of a reduction to phrenological places continues to reassert itself with each new correlation of mind to a brain area that the latest scanner provides. However, in our drift towards a network doctrine, we must not forget about the more fixed parameters and more bounded structures. The risk is that global re-entrant networks, functioning according to the laws of mathematical chaos or stochastic resonance, will light up the sky in a fashion that overlooks the contributions of the specific landscape. It is perhaps human nature to irrevocably shift between the global

and the discrete,1 overshooting emphasis upon one in favor of the other, in an ongoing dialectical transition. Instead, can such a shifting occur because we do not have coherent answers to the mind/ brain problem? I know that in my primary area, psychoanalysis, models of mind are plagued with unacknowledged attachments to one variety of the mind-brain problem or another, often with very confusing results. Certainly, until we understand more, balance is what is desired. We can certainly assert that the living brain, along with the mind that emerges from it, surely result from a delicate balance and as yet poorly understood relationship between *place* and *process*. This paper will deliberately focus upon examples of the global and the discrete, as both are relevant to our understanding disorders of consciousness, and therefore brain coma and brain death. I will begin with an a brief history of neurodynamics through the lens of the EEG, briefly review the history of research in the identification of brain stem nuclei and their functions, and then turn to the local stimulation of neurons, an even finer level of place, with the best example being deep brain stimulation (DBS). On the surface, neurodynamics and DBS are strange bedfellows (wide scale vs. local), but by viewing them side-by-side, I hope to heighten the reader's appreciation that both the large scale and the minute must be simultaneously considered. Neurodynamics runs the risk of deemphasizing the particular contributants; a local emphasis (and a stimulating technology that is very local, DBS) runs the risk of ushering in an

C-24
Perception inT
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Transference is a key concept in psychoanalysis, distinguishing the analytic technique from other forms of psychotherapy. Despite its centrality in psychoanalysis, the concept remains poorly defined, and there exist many competing and contradictory perspectives. Little literature exists that views transference as a form of intentional action and perception, and most conceptualizations describe it in terms of emotional, person-oriented reconstitution of earlier attachments. We very briefly review the analytic literature and mention interdisciplinary attempts to illuminate a clearer definition of transference, define transference through the lens of perception, and propose that it is ubiquitous in humans, is an adaptive ego function when not impaired, and that it emerges, along with countertransference, in the context of an interpersonal matrix. We link our viewpoint to the emergence of attachments in mammals and the evolution of a limbic system in vertebrate brains. Further, we find support for our thesis in the brain research of Walter J. Freeman, who initially elaborated, through multiple array EEG's, a neurodynamic basis for our model of perception, and how transference is a form of it. Freeman worked initially within the sensory domain of olfaction though his findings have been confirmed in other sensory modalities. Transference is a hierarchically integrated perceptual modality of a higher order, though it depends upon th fo

C-25 Rabies In
Approaches
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Objective. To review the diagnosis of rabies in critical care patients and the options for therapeutic approaches. Methods. Evaluated (1) all indigenously acquired cases of human rabies in the United States and Canada from 1980-2008 and (2) all known cases of rabies treated worldwide with the "Milwaukee Protocol." Results. Of 45 naturally acquired cases, bat virus variants were the most common cause (41/45-91%) and most of these patients did not have a history of a bite. Of the other 4 cases, 2 were from dog, 1 from skunk, and 1 from raccoon. Four cases were iatrogenic, resulting from transplantation of organs and a vascular conduit. A Canadian patient was maintained for weeks after the presumed onset of brain death. Therapeutic (induced) coma (midazolam and phenobarbital given to maintain a burst-suppression pattern on the EEG), ketamine, and antiviral therapies (dubbed the "Milwaukee Protocol") were given to a survivor, but this therapy was not directly re-

sponsible for the favourable outcome. There have been many subsequent failures of similar therapeutic approaches. Conclusions. Physicians in the US and Canada are not knowledgeable about the clinical features of rabies and often fail to consider rabies even after presentation with typical clinical features. Laboratory diagnostic evaluation for rabies includes skin biopsy, CSF, and saliva specimens for rabies virus antigen and/or RNA detection. There is no scientific rationale for the use of therapeutic coma in human rabies. New approaches to treating hun

C-26

Emerging conceptso

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Abstract (for oral presentation):

Objective: To consider the implications for a theory of consciousness of recent reinterpretations of the functional relationship between the cortex and the thalamus. Methods: The classical understanding of the thalamus as the sensory "gatekeeper" to the cortex is Disorders of onsciousness arise from disruptions of these mechanisms. reviewed against an emerging reinterpretation by a number of neuroscientists. The newer view regards corticothalamic tracts as directing the activity of thalamocortical ones. The cortex projects goal-directed hypotheses, then receives confirmatory or disconfirmatory evidence from the subcortical structures. This is directly relevant to theories of consciousness because psychological models align with neuroanatomic principles, and theories of consciousness align with distinct psychological models. Behaviorism invoked the reflex arc for neuroanatomic support and views consciousness as an illusion. Information processing psychology aligns with the classical thalamocortical "gatekeeper" model and views consciousness as containing so many "information structures". Constructivist psychology aligns with the newer neuroanatomic view, and sees consciousness as an active process of projecting hypotheses about the world and testing them via the subcortical transmission of confirmatory and disconfirmatory evidence. Two case studies of receptive aphasia are presented that exemplify the constructivist phenomenon of hypothesis testing in reading and dyslexia. Conclusions: Consciousness is neither an illusion nor the superficial awareness of subconscious information structures. Rather, it is the active process of hypothesis formation and hypothesis-testing.