WFN Launches Coma and Disorders of Consciousness Research Group

BY OLIVIA GOSSERIES, PHD, AND STEVEN LAUREYS, MD, PHD

The trustees of the World Federation of Neurology (WFN) recently approved a newly created Applied Research Group on Coma and Disorders of Consciousness, chaired by Steven Laureys.

Its mission, consistent with the goals and objectives of the WFN, is to improve worldwide the knowledge and care of patients with brain death, coma, locked-in syndrome and chronic disorders of consciousness following severe acquired brain damage such as vegetative state/unresponsive wakefulness and minimally conscious state. We aim to achieve this mission by improving the best care, diagnosis, prognosis, treatment, prevention and scientific understanding; by facilitating multidisciplinary research, education and public awareness in this challenging field combining neurological, epidemiological, neuroscientific (including in the fast-growing fields of functional neuroimaging, electrophysiology, neuro-engineering and computational sciences), neuro-ethical, philosophical and legal expertise.

Coma is an acute condition of unarousable unresponsiveness in which patients never show any eye opening. Unresponsive wakefulness syndrome (previously coined vegetative state) is defined by wakefulness (i.e. eye opening) without any sign of awareness of self and the environment whereas minimally conscious patients show fluctuating signs of awareness such as visual pursuit, localization to pain or reproducible response to command but they remain unable to communicate consistently. This condition has been recently subcategorized in “minimally conscious s-” for patients who present high-order behavioral responses to stimuli (with preservation of language processing ability) and “minimally conscious –” for patients who only show low-level non-reflexive responses to stimuli (e.g., visual pursuit).

Recovery of the ability to functionally communicate or to use objects adequately is necessary for the diagnosis of the emergence of a minimally conscious state. Finally, patients who show non-behavioral evidence of consciousness or communication only measurable via complimentary testing (i.e., functional MRI, positron emission tomography, EEG or evoked potentials) can be considered to be in a functional locked in syndrome.

The presence or absence of consciousness is assessed at the patient’s bedside by searching for response to command or non-reflexive behaviors in response to stimulation. Assessing the level of consciousness of noncommunicative brain-damaged patients is therefore difficult, as consciousness is a subjective first-person experience and you necessarily need to make inferences about its presence based on the patient’s behavior. In the acute setting, the Full Outline of UnResponsiveness has been proposed as an alternative for the widely used Glasgow Coma Scale.

To disentangle vegetative/unresponsive from minimally conscious/responsive states, other scales have been validated such as the Coma Recovery Scale-Revised. Still, patients might present severe limitation from motor dysfunction (e.g., paralysis and spasticity), sensory deficit (e.g., deafness, blindness), impaired cognitive processing (e.g., aphasia, apraxia), fluctuation of vigilance and pain that can prevent voluntary responses. So even with the best clinical assessment, patients might be underestimated in terms of residual brain function and conscious awareness.

Indeed recent studies provide evidence for preserved awareness in some behaviorally unresponsive patients. For instance, using functional MRI or EEG, such patients may activate specific brain areas and generate appropriate brain responses when performing cognitive tasks on command (e.g. imagine to move), similar to those observed in healthy controls. These paradigms allow inferring consciousness and may even permit to communicate in some exceptional cases. However, more research and multi-centric collaboration is needed to validate the accuracy of these novel technologies at the single patient level. Similarly, the clinical value of prog nostic markers ranging from simple behavioral signs to sophisticated brain measures such as diffusion tensor imaging MRI requires continuing validation by large international cohort studies.

Clearly, severely brain-damaged patients and disorders of consciousness represent a major diagnostic, prognostic, therapeutic and often ethical challenge for neurology.

Table 1. Entities following a severe brain injury.

Clinical examination

<table>
<thead>
<tr>
<th>Coma</th>
<th>No eye opening</th>
<th>No reflex behavior</th>
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</thead>
<tbody>
<tr>
<td>Unresponsive state</td>
<td>Eye opening</td>
<td>Non reflex behavior</td>
</tr>
<tr>
<td>Minimally conscious state</td>
<td>Eye opening</td>
<td>Functionally communicative</td>
</tr>
<tr>
<td>Emergence</td>
<td></td>
<td>Functional use of objects</td>
</tr>
</tbody>
</table>

Locked-in syndrome

| No motor output | No eye opening | Non spoken communication |
| Functional locked-in syndrome | | |

Paraclinical examination

Disagreement between clinical diagnosis and neuroimaging results showing preserved higher cognitive functions.

By Olivia Gossseries, PhD, and Steven Laureys, MD, PhD

In Memoriam

Professor Mario Tolentino Dipp
1928-2012

Unquestionably, the father of Dominican neurology, honest, studious in the extreme, a teacher by vocation, uniting worker, dedicated to his patients and his pupils. He gave of himself everything that can be expected from a great teacher and a great man.

Professor Tolentino died Sept. 27, 2012, from an aggressive cancer of the pancreas, which only allowed him three months of life following diagnosis. Until then, he was active both academically and in patient care.

He became a Doctor of Medicine at University of Santo Domingo in 1953 and studied neurology and psychiatry at the University of Paris from 1953 to 1957. He trained at the birthplace of world neurology — the Salpetriere Hospital — under the direction of Professors Theophile Alajouanine, Paul Castaigne, Jean Nick and Jean Lhermitte. In St. Anne hospital, he had Professors Jean Delay, Pierre Pelot, Pierre Deniker and Theres Lermieri. At the Foch Hospital, he had as a guide Gerard Guistot.

From October 1953 to February 1957, he attended conferences by Professors Raymond Garcin, Henry Eyi and Jacques Lacan. In February 1957, he obtained a state diploma in neurology, psychiatry given by the Faculty of Medicine at the University of Paris.

At the end of 1957, he was appointed as a neurologist at the Hospital Salvador B. Gautier of the Dominican Institute of Social Security and became the chief, a job that was made official in 1962.

In 1962, he was made assistant professor of neurology at the University of Santo Domingo. In the same year, he was named professor in the School of Nursing. In 1963, he was appointed neurologist at the Center of Neurorehabilitation in Santo Domingo.