

5th Congress of the European Academy of Neurology

Oslo, Norway, June 29 - July 2, 2019

Teaching Course 14

**Diagnosing coma and disorders of consciousness - pearls
and pitfalls from a new EAN guideline (Level 1 or 2)**

Clinical examination in the ICU

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EAN Guideline
on the Classification of
Coma and other Disorders of Consciousness

-
Clinical topics

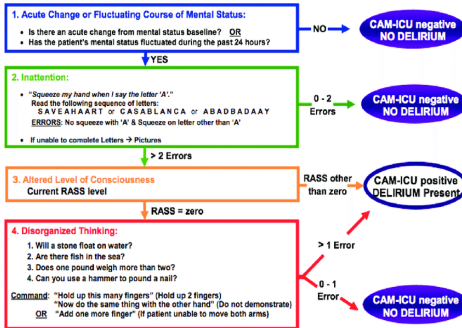
Question *“Should spontaneous motor behaviors be observed to diagnose signs of consciousness in patients with DoC?”*

Answer *“Spontaneous motor behavior and automatic motor responses may be observed and documented (very low evidence, weak recommendation).”*

No publication

Question “Should the Confusion Assessment Method for the ICU or the Confusion Assessment Protocol be used to diagnose delirium in DoC patients in the ICU?”

Confusion Assessment Method for the ICU (CAM-ICU) Flowsheet



Answer “We advise against using the CAM-ICU in DoC patients in the ICU (very low evidence, weak recommendation).”

No publication

Richmond Agitation-Sedation Scale (RASS) (1 very agitated -5 no interaction

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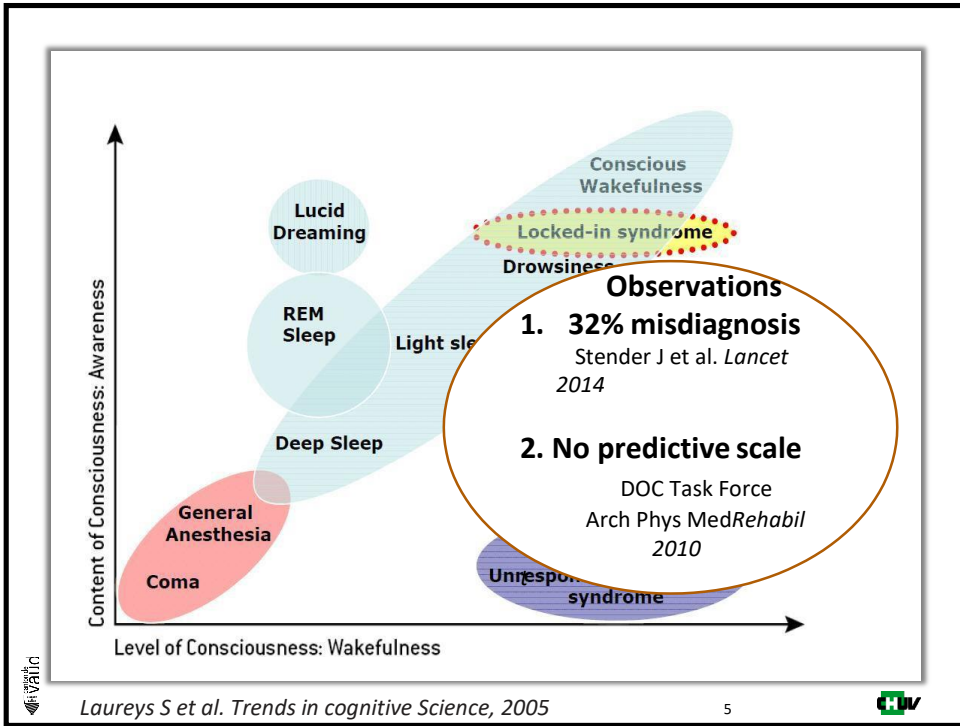
Departement of Clinical Neurosciences,
University Hospital Lausanne, **Switzerland**

Coma and other Disorders of Consciousness

Pitfalls of Clinical Examination in the very acute phase (ICU)

**Dr.K.Diserens, PD- MER,
Co-chair Coma Panel EAN**

Head of the Acute Neurorehabilitation UNIT
Neurology



Why misdiagnosis ?

Definition

REVIEWS

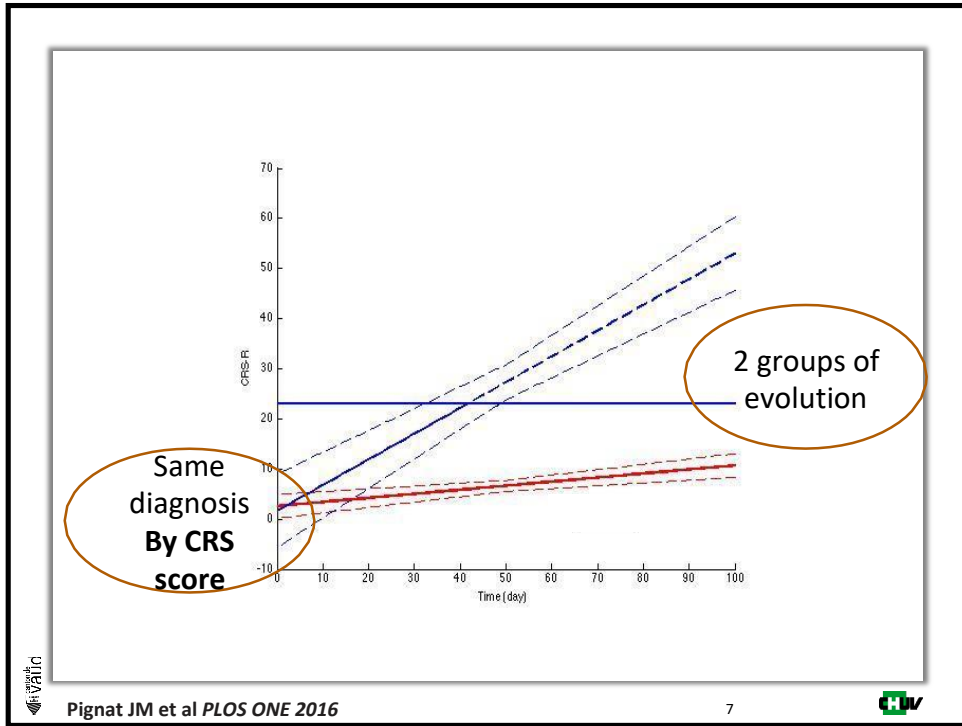
Disorders of consciousness after acquired brain injury: the state of the science

Joseph T. Giacino, Joseph J. Gold, Nicholas D. Schiff

Giacino, J. T. et al. published online 28 January 2014;

William James , 1894:
 “human consciousness consists of serially time-ordered , organized, restricted and reflective awareness of self and the environment. Moreover, it is an experience of graded complexity and quantity.”

Not a diagnosis of sickness but description of behaviour



J Neurol (2011) 258:1373–1384
 DOI 10.1007/s00415-011-6114-x

MEDICAL PROGRESS IN THE JOURNAL OF NEUROLOGY

**From unresponsive wakefulness to minimally conscious PLUS
 and functional locked-in syndromes: recent advances in our
 understanding of disorders of consciousness**

Marie-Aurélié Bruno · Audrey Vanhauzenhuyse ·
 Aurore Thibaut · Gustave Moonen ·
 Steven Laureys

EDITORIAL

Cognitive Motor Dissociation Following Severe Brain Injuries

Nicholas D. Schiff, MD

JAMA Neurology Published online October 19, 2015

Wolters
Kluwer

9



doi:10.1093/brain/awx163

BRAIN 2017; 140; 2120-2132 | 2120

BRAIN
A JOURNAL OF NEUROLOGY

Brain networks predict metabolism, diagnosis and prognosis at the bedside in disorders of consciousness

Srivas Chennu,^{1,2} Jitka Annen,³ Sarah Wannez,³ Aurore Thibaut,^{3,4} Camille Chatelle,^{3,5,6} Helena Cassol,³ Géraldine Martens,³ Caroline Schnakers,^{7,8} Olivia Gosseries,³ David Menon⁷ and Steven Laureys³

doi:10.1093/brain/awx176

BRAIN 2017; 140; 2399-2414 | 2399

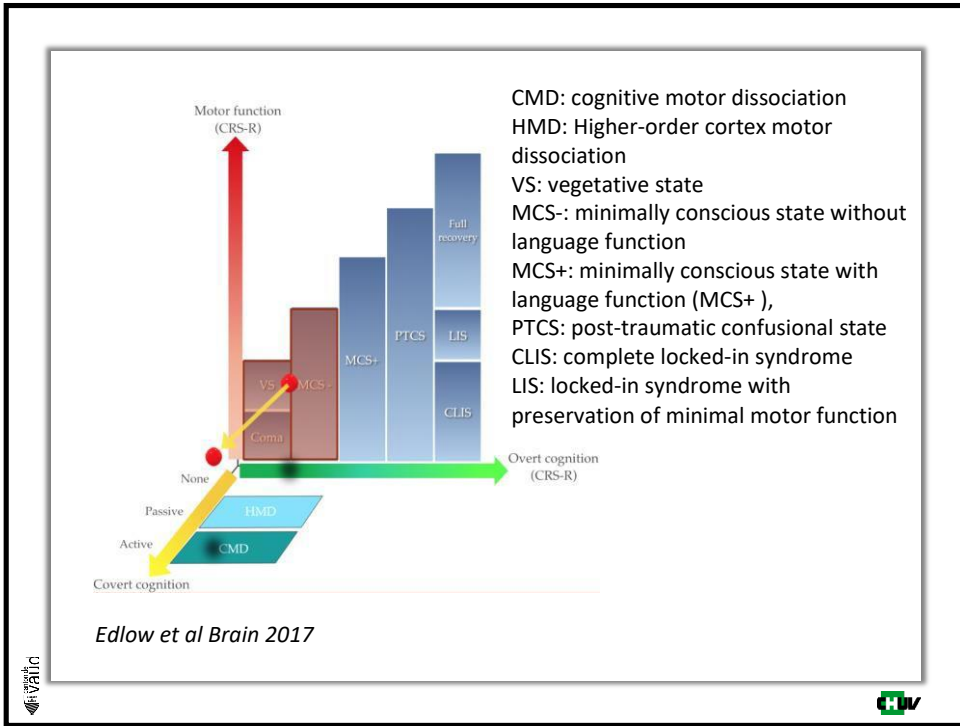
BRAIN
A JOURNAL OF NEUROLOGY

Early detection of consciousness in patients with acute severe traumatic brain injury

Brian L. Edlow,^{1,2,3,*} Camille Chatelle,^{1,2,4,*} Camille A. Spencer,² Catherine J. Chu,² Yelena G. Bodien,^{1,2,5} Kathryn L. O'Connor,² Ronald E. Hirschberg,^{5,6} Leigh R. Hochberg,^{1,2,7} Joseph T. Giacino,^{5,6} Eric S. Rosenthal^{2,8} and Ona Wu^{3,8}

Wolters
Kluwer





Pitfalls of the validated Coma scales

GLASGOW COMA SCORE

Eye(s) Opening		
Spontaneous		4
To speech		3
To pain		2
No response		1
Verbal Response		
Oriented to time, place, person	5	
Confused/disorientated	4	
Inappropriate words	3	
Incomprehensible sounds	2	
No response	1	
Best Motor Response		
Obeys commands	6	
Moves to localised pain	5	
Flexion withdraws from pain	4	
Abnormal flexion	3	
Abnormal extension	2	
No response	1	
<i>Best response</i>	15	
<i>Comatose patient</i>	8 or less	
<i>Totally unresponsive</i>	3	

MAX
15
Points

FOUR Score

Eye Response

- 4 Eyelids open or opened, tracking or blinking to command
- 3 Eyelids open but not tracking
- 2 Eyelids closed but opens to loud voice
- 1 Eyelids closed but opens to pain
- 0 Eyelids remain closed with pain

Motor Response

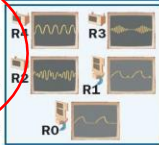
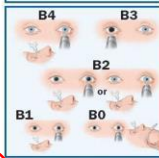
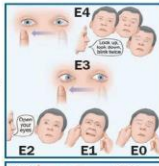
- 4 Thumbs up, fist, or peace sign to command
- 3 Localizing to pain
- 2 Flexion response to pain
- 1 Extensor posturing
- 0 No response to pain or generalized myoclonus status epilepticus

Brainstem Reflexes

- 4 Pupil and corneal reflexes present
- 3 One pupil wide and fixed
- 2 Pupil or corneal reflexes absent
- 1 Pupil and corneal reflexes absent
- 0 Absent pupil, corneal, and cough reflex

Respiration

- 4 Not intubated, regular breathing pattern
- 3 Not intubated, Cheyne-Stokes breathing pattern
- 2 Not intubated, irregular breathing pattern
- 1 Breathes above ventilator rate
- 0 Breathes at ventilator rate or apnea



Instructions for the Assessment of the Individual Categories of the FOUR Score

Eye Response (E)

Grade the best possible response after at least 3 trials in an attempt to elicit the best level of alertness. A score of E4 indicates at least 3 voluntary eye movements. If eyes are closed, the examiner should open them and examine tracking of a finger or object. Tracking with the opening of 1 eyelid will suffice in cases of eyelid edema or facial trauma. If tracking is absent horizontally, examine vertical tracking. Alternatively, 2 blinks on command should be documented. This will recognize a locked-in syndrome (patient is fully aware). A score of E3 indicates the absence of voluntary tracking with open eyes. A score of E2 indicates eyelids opening to loud voice. A score of E1 indicates eyelids open to pain stimulus. A score of E0 indicates no eyelids opening to pain.

Motor response (M)

Grade the best possible response of the arms. A score of M4 indicates that the patient demonstrated at least 1 of 3 hand positions (thumbs-up, fist, or peace sign) with either hand. A score of M3 indicates that the patient touched the examiner's hand after a painful stimulus compressing the temporomandibular joint or supraorbital nerve (localization). A score of M2 indicates any flexion movement of the upper limbs. A score of M1 indicates extensor posturing. A score of M0 indicates no motor response or myoclonus status epilepticus.

Brainstem reflexes (B)

Grade the best possible response. Examine pupillary and corneal reflexes. Preferably, corneal reflexes are tested by instilling 2-3 drops of sterile saline on the cornea from a distance of 4-6 inches (this minimizes corneal trauma from repeated examinations). Cotton swabs can also be used. The cough reflex to tracheal suctioning is tested only when both of these reflexes are absent. A score of B4 indicates pupil and cornea reflexes are present. A score of B3 indicates one pupil wide and fixed. A score of B2 indicates either pupil or cornea reflexes are absent. B1 indicates both pupil and cornea reflexes are absent and a score of B0 indicates pupil, cornea and cough reflex (using tracheal suctioning) are absent.

Respiration (R)

Determine spontaneous breathing pattern in a nonintubated patient, and grade simply as regular R4, irregular R2, or Cheyne-Stokes R3 breathing. In mechanically ventilated patients, assess the pressure waveform of spontaneous respiratory pattern or the patient triggering the ventilator R1. The ventilator monitor displaying respiratory patterns is used to identify the patient generated breaths on the ventilator. No adjustments are made to the ventilator while the patient is graded, but grading is done preferably with PaCO2 within normal limits. A standard apnea (oxygen-diffusion) test may be needed when patient breathes at ventilator rate R0.



200 First Street SW
Rochester, Minnesota 55905
www.mayoclinic.org

16CXXX-09S-XXXX

MAX
16
Points



PAIN® xxx (2009) xxx-xxx



www.elsevier.com/locate/pain

The nociception coma scale: A new tool to assess nociception in disorders of consciousness

Caroline Schnakers ^{a,*}, Camille Chatelle ^a, Audrey Vanhaudenhuyse ^a, Steve Majerus ^{b,c}, Didier Ledoux ^c, Melanie Boly ^{a,d,e}, Marie-Aurélie Bruno ^{a,c}, Pierre Boveroux ^{a,f}, Athena Demertzi ^a, Gustave Moonen ^d, Steven Laureys ^{a,d,e}

^aComa Science Group, Cyclotron Research Centre, University of Liège, Sart Tilman, B30, 4000 Liège, Belgium

Table 1
Protocol of the Nociception Coma Scale (detailed administration guidelines in Complementary online material).

Motor response	
4	– Localization to noxious stimulation
2	– Flexion withdrawal
1	– Abnormal posturing
0	– None/flaccid
Verbal response	
3	– Verbalisation (intelligible)
2	– Vocalisation
1	– Groaning
0	– None
Visual response	
3	– Fixation
2	– Eyes movements
1	– Startle
0	– None
Facial expression	
3	– Cry
2	– Grimace
1	– Oral reflexive movement/startle response
0	– None

MAX
12
Points



Assessment Scales for Disorders of Consciousness: Evidence-Based Recommendations for Clinical Practice and Research
Report of the American Congress of Rehabilitation Medicine, Brain Injury-Interdisciplinary Special Interest Group, Disorders of Consciousness Task Force

Arch Phys Med Rehabil 2010;91:1795-1813.

Table 2: DOC Scales: Standardization of Procedures, Interpretive Guidelines, and Evaluation of Item Content Based on Aspen Workgroup Criteria

Scale	Author (y)	Std Admin/Scoring	Dx Guide	Aspen WC Diff Dx	Aspen WC VS→MCS	Aspen WC MCS→Emerg
CRS-R	Giacino (2004)	Y	Y	Y	4	2
SSAM	Rader (1994)	N	N	N	4	1
WNSSP	Ansell (1989)	N	N	N	4	1
SMART	Gill-Thwaites (1999)	N	N	N	4	1
WHIM	Shiel (2000)	N	N	N	4	1
DOCS	Pape (2005)	Y	N	N	3	0
CNC	Rappaport (1992)	Y	N	N	3	0
CLOCS	Stanczak (1984)	Y	N	N	3	0
LOEW	Borer-Alafi (2002)	Y	N	N	3	0
RLS85	Stalhammar (1988)	Y	N	N	3	0
FOUR	Wijdicks (2005)	Y	N	N	2	0
GLS	Born (1985)	Y	N	N	2	0
INNS	Benzer (1991)	Y	N	N	1	0

Absence of motor response is not unconsciousness

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Adapted examination by Coma Recovery Scale

Repetitive stimulation (4)

Stimulation of 5 senses

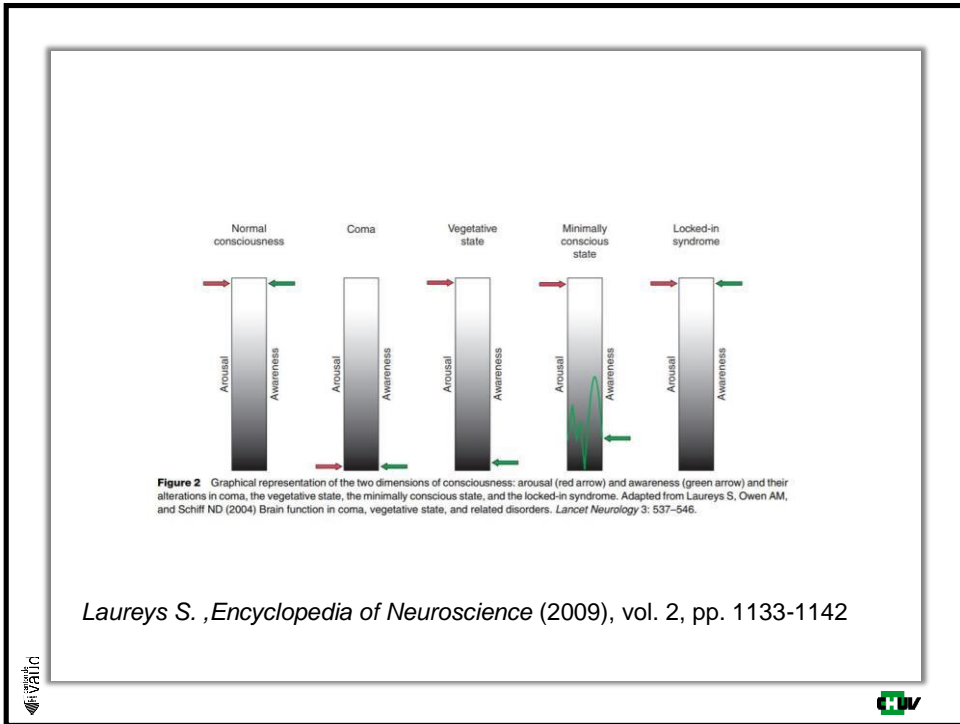


Slowed reaction
(15 seconds)

Motivation

©vatic

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Trap: definition Coma

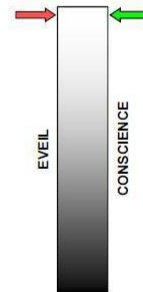
- Closed eyes
- No sign of perception of self and environment
- Min 1 h

Multi-Society Task Force on Persistent Vegetative State guidelines, 1994, the European Task Force on Disorders of Consciousness, BMC Medicine 2010, 8:68

Trap: definition Locked-in

Table 4 Criteria for the locked-in syndrome (American Congress of Rehabilitation Medicine)

- Sustained eye opening (bilateral ptosis should be ruled out as a complicating factor)
- Quadriplegia or quadripareisis
- Aphonia or hypophonia
- A primary mode of communication that uses vertical or lateral eye movement or blinking of the upper eyelid to signal yes/no responses
- Preserved awareness of the environment



American Congress of Rehabilitation Medicine, 1995

Laureys et al. *BMC Medicine* 2010, **8**:68
<http://www.biomedcentral.com/1741-7015/8/68>



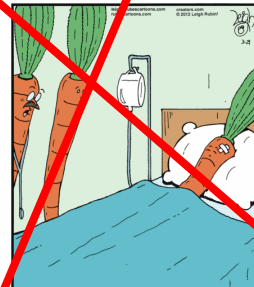
DEBATE

Open Access

Unresponsive wakefulness syndrome: a new name for the vegetative state or apallic syndrome

Steven Laureys^{1*}, Gastone G Celesia², Francois Cohadon³, Jan Lavrijsen⁴, José León-Carrión⁵, Walter G Sannita^{6,7}, Leon Szabon⁸, Erich Schmutzhard⁹, Klaus R von Wild^{10,11}, Adam Zeman¹², Giuliano Dolce¹⁵, the European Task Force on Disorders of Consciousness¹

→ Unresponsive wakefulness syndrome (UWS)

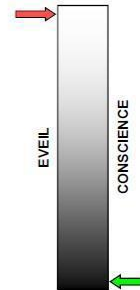


"The good news is that he's in a permanent vegetative state."

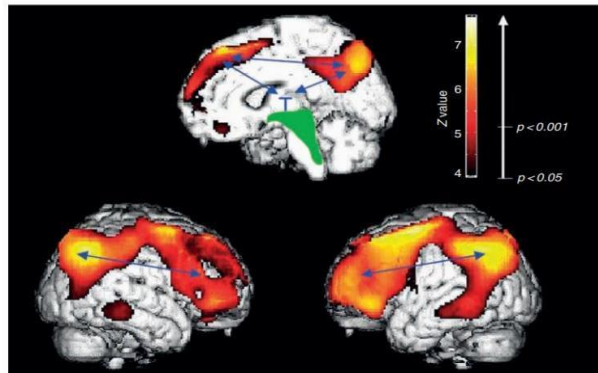
Trap definition of UWS (unresponsive wakefulness syndrome) *Before: « vegetative state »*

Table 2 Criteria for the vegetative state (US Multi-Society Task Force on Persistent Vegetative State guidelines)

- No evidence of awareness of self or environment and an inability to interact with others
- No evidence of sustained, reproducible, purposeful, or voluntary behavioral responses to visual, auditory, tactile, or noxious stimuli
- No evidence of language comprehension or expression
- Intermittent wakefulness manifested by the presence of sleep-wake cycles
- Sufficiently preserved hypothalamic and brain stem autonomic functions to permit survival with medical and nursing care
- Bowel and bladder incontinence
- Variably preserved cranial nerve and spinal reflexes



vitalin



Vegetative state

«No endogenous machinery» (D Muresanu)
Diffuse **disconnection** inbetween the cortical network encompassing medial and lateral prefrontal, parietal multimodal associative areas, **Cortico-cortical, Thalamo-cortical** Disconnections (Default Mode Network)
Preserved brainstem

vitalin



Trap: definiton MSC (Minimal consciousness syndrome)

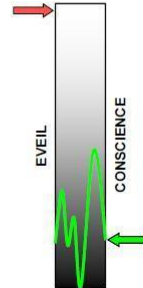
Table 3 Criteria for the minimally conscious state (Aspen Neurobehavioral Conference Workgroup)

Clearly discernible evidence of awareness of self or environment, on a reproducible or sustained basis, by at least one of the following behaviors:

- Purposeful behavior (including movements or affective behavior that occurs in contingent relation to relevant environment stimuli and are not due to reflexive activity), such as:
 - Pursuit eye movement or sustained fixation occurring in direct response to moving or salient stimuli
 - Smiling or crying in response to verbal or visual emotional (but not neutral) stimuli
 - Reaching for objects demonstrating a relationship between object location and direction of reach
 - Touching or holding objects in a manner that accommodates the size and shape of the object
- Vocalizations or gestures occurring in direct response to the linguistic content of questions
- Following simple commands
- Gestural or verbal yes/no response (regardless of accuracy)
- Intelligible verbalization

Emergence from the minimally conscious state requires reliable and consistent demonstration of at least one of the following behaviors:

- Functional interactive communication: accurate yes/no responses to six of six basic situational orientation questions (including items as, "Are you sitting down?" and "Am I pointing to the ceiling?") on two consecutive evaluations
- Functional use of two different objects (such as bringing a comb to the head or a pencil to a sheet of paper) on two consecutive evaluations



ivatic



Subtle clinical neurological examination + observation of motor behaviour in the very acute phase



ivatic



2016



Outcome Prediction of Consciousness Disorders in the Acute Stage Based on a Complementary Motor Behavioural Tool

Jean-Michel Pignat, Etienne Mauron, Jane Jöhr, Charlotte Gilart de Keranflech, Dimitri Van De Ville, Maria Giulia Preti, Djalel E. Meskaldji, Volker Hömberg, Steven Laureys, Bogdan Draganski, Richard Frackowiak, Karin Diserens

Published: June 30, 2016 • <http://dx.doi.org/10.1371/journal.pone.0156882>



Methodology

Definition of NRA-MBT (Motor Behaviour Tool)

Validated scale
Coma recovery scale
CRS-R
+ MBT: 7 items
observation of motor
behaviour and of
communication

MOTOR BEHAVIOUR TOOL – revised MBT-R				
Record Form				
Patient :		Date :	Time (AM)/(PM)	Examiner :
Positive signs				
1	Spontaneous non-reflexive movements		YES	NO
	if YES precise			
2	Response to command		YES	NO
3	Visual fixation or visual pursuit		YES	NO
4	Responses in a motivational context		YES	NO
Responses to a noxious stimulation				
5.a	Defensive response - Nipple		YES	NO
5.b	Defensive response – Nailbed		YES	NO
5.c	Grimace		YES	NO
Negative signs				
6	Abnormal posturing (i.e., decerebration/decortications, primitive reflexes) or neurovegetative responses (i.e., tachycardia, hypo/hyper-ventilation, hypertension, excessive sweating) to stimulation		YES	NO
7	Signs of roving eyes or, absence of oculocephalic reflex		YES	NO



Pignat JM, Jöhr J, Keranflech, Hömberg V, Laureys S, Frackowiak R, Diserens K. *Et al* PLOS ONE 2016

Differentiation of 2 groups using MBT

CMD

Cognitivo- Motor Dissociation

- **akinetic or hypokinetic movements**
- amimetism
- perseveration
- oculomotor deficit
- **grimacing** and localisation of pain on stimulation
- no response to verbal stimulation

MCS/UWS (=DOC)

- **stereotypical abnormal posture**
- **reflex movements**
- **absence of grimacing**
- reflex reaction to pain with typical movements of decortication

vivo

Pignat JM, Johr J, C Keranflech, Hömberg V, Laureys S, Frackowiak R, Diserens K. *Et al PLOS ONE 2016*

Mr G, 43 old
TBI
coma



Mr D, 26 old
TBI
coma



vivo



Disorders of consciousness (DOC) or CMD (Cognitivo-motor dissociation) ?



CMD
M G

Binary
evaluation !

DOC
M D.

MOTOR BEHAVIOUR TOOL – revised MBT-R Record Form				MOTOR BEHAVIOUR TOOL – revised MBT-R Record Form			
Patient :	Date :	Time ... (AM)/(PM)	Examiner :	Patient :	Date :	Time ... (AM)/(PM)	Examiner :
Positive signs				Positive signs			
1	Spontaneous non-reflexive movements if YES precise	YES	NO	1	Spontaneous non-reflexive movements if YES precise	YES	NO
2	Response to command	YES	NO	2	Response to command	YES	NO
3	Visual fixation or visual pursuit	YES	NO	3	Visual fixation or visual pursuit	YES	NO
4	Responses in a motivational context	YES	NO	4	Responses in a motivational context	YES	NO
Responses to a noxious stimulation				Responses to a noxious stimulation			
5	5.a Defensive response - Nipple	YES	NO	5	5.a Defensive response - Nipple	YES	NO
	5.b Defensive response - Nailbed	YES	NO		5.b Defensive response - Nailbed	YES	NO
	5.c Grimace	YES	NO		5.c Grimace	YES	NO
Negative signs				Negative signs			
6	Abnormal posturing (i.e., decerebration/decortications, primitive reflexes) or neurovegetative responses (i.e., tachycardia, hypo/hyper-ventilation, hypertension, excessive sweating) to stimulation	YES	NO	6	Abnormal posturing (i.e., decerebration/decortications, primitive reflexes) or neurovegetative responses (i.e., tachycardia, hypo/hyper-ventilation, hypertension, excessive sweating) to stimulation	YES	NO
7	Signs of roving eyes or, absence of oculocephalic reflex	YES	NO	7	Signs of roving eyes or, absence of oculocephalic reflex	YES	NO



Pignat JM, Johr J,C Keranflech, Hömberg V, Laureys S, Frackowiak R, Diserens K. Et al PLOS ONE 2016

Nipple sign

M. G

CRS-R	3, coma
GCS:	5, coma
MBT	CMD



M.D

CRS-R	3, coma
GCS	5, coma
MBT:	Coma



vitalin

HIV

MBTr – nipple sign

Responses to a noxious stimulation applied to the nipple :

Non reflexive intentional responses vs. reflexive stereotypical motor reaction



Defensive response
(intentional)



Stereotypical
pattern in flexion



Stereotypical
pattern in extension

vitalin

HIV

M. G

4 weeks pos TBI later

M.D

CRS-R 7, UWS
GCS: 8
MBT **CMD**

CRS-R 7, UWS
GCS: 8
MBT UWS



vitalic



M. G

6 weeks post TBI

M.D

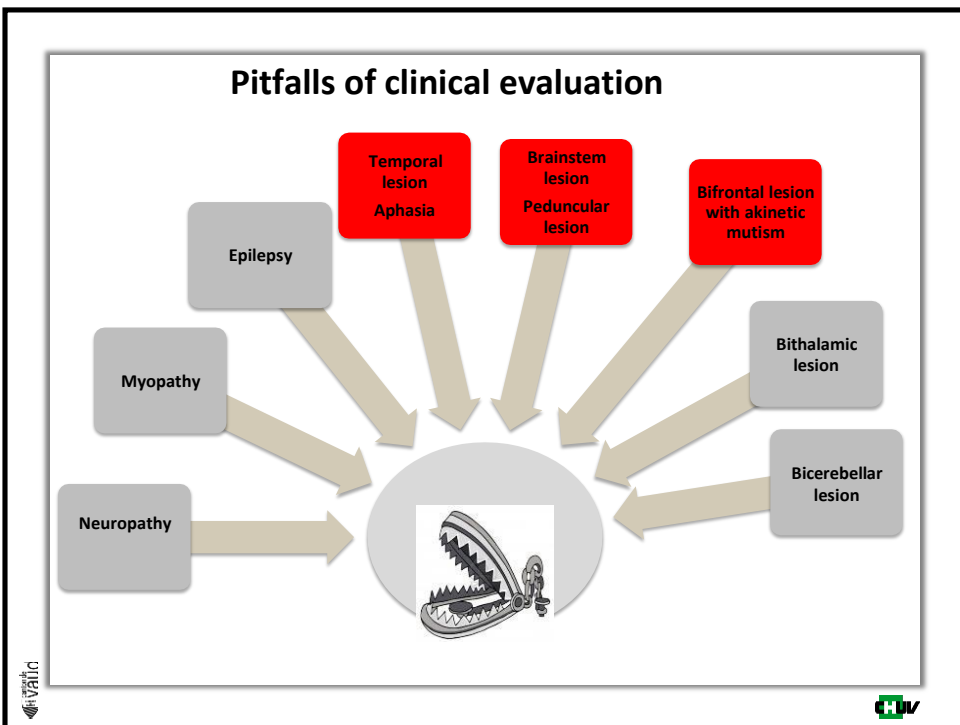
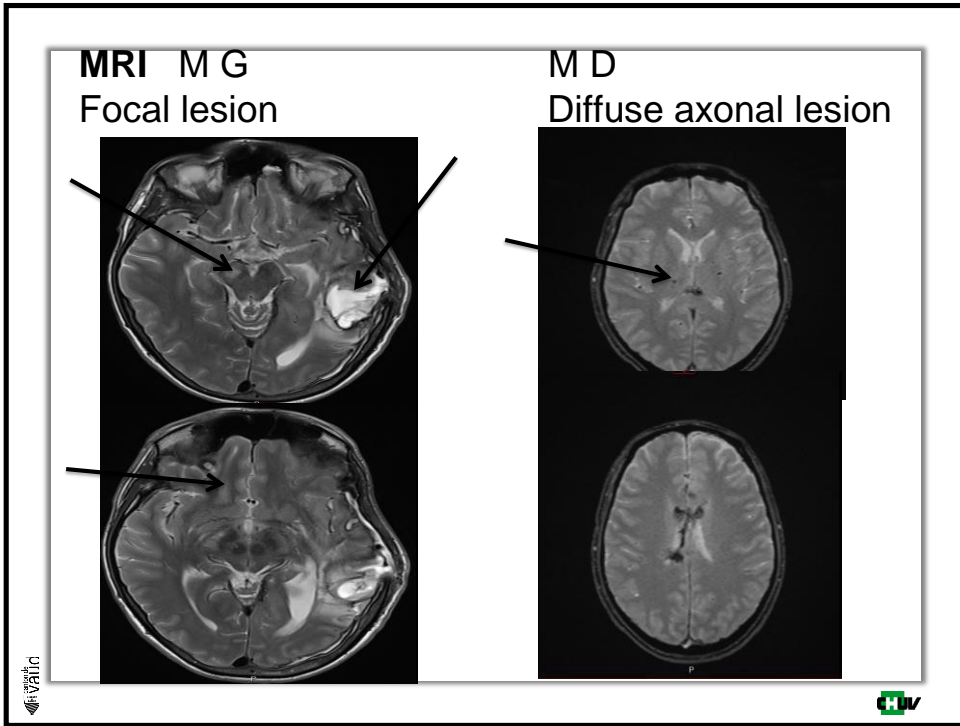
CRS-R 18, MCS
GCS: 11
MBT **CMD**

CRS-R 15, MCS
GCS: 11
MBT MCS



vitalic





9 weeks post brain injury



vivo

CHV

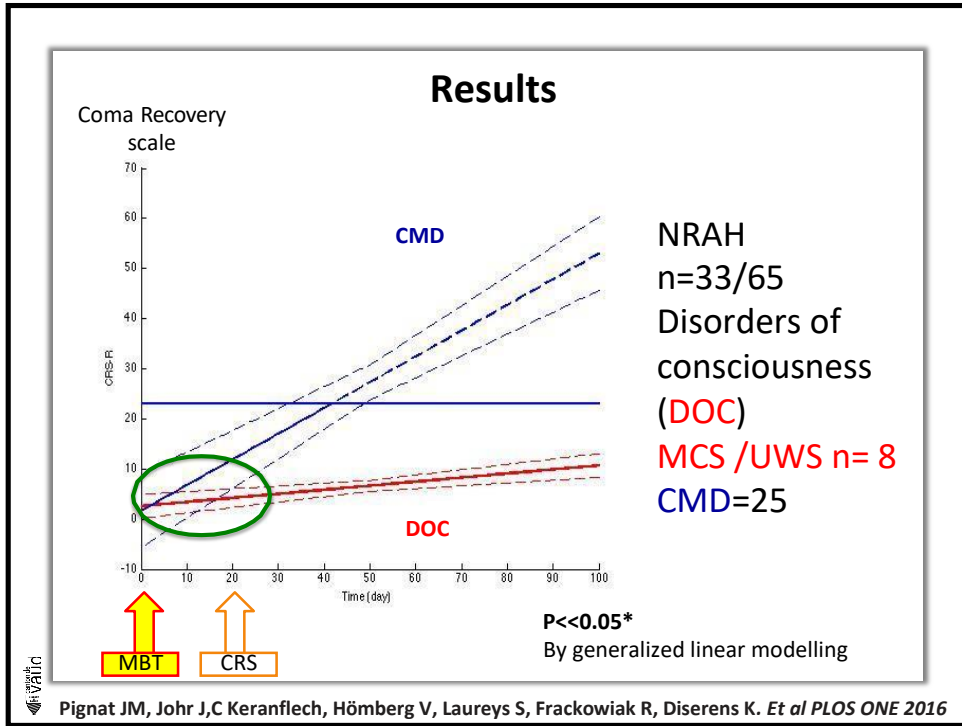
5 months post brain injury



vivo

40

CHV



Results

	DOC	CMD	
General	Gender male/female	5 (63%) / 3 (38%)	16 (64%) / 9 (36%)
	Age (mean)	26.6+/-13.3	56.3+/-18.2
	Number (Total = 33)	8 (24%)	25 (76%)
Etiology	Ischemic Stroke	0	14 (56%)
	Traumatic brain injury	5 (63%)	11 (44%)
	Aneurysm	1 (13%)	2 (0.08)
	Anoxia	1 (13%)	0
	Infection	0	0
	Hemorrhage	0	1 (4%)
	Others	1 (13%)	0
Lesions' Localization	Right/Left Frontal lobe	5 (63%) / 5 (63%)	10 (40%) / 9 (36%)
	Right/Left Temporal lobe	3 (38%) / 3 (38%)	10 (40%) / 6 (24%)
	Right/Left Parietal lobe	1 (13%) / 3 (38%)	5 (20%) / 5 (20%)
	Right/Left Occipital lobe	0 / 0	2 (8%) / 1 (4%)
	Right/Left basal ganglia	2 (25%) / 4 (50%)	3 (12%) / 3 (12%)
	Ponto-mesencephalic region	1 (13%)	5 (25%)
Outcome	Diffuse axonal lesion	2 (25%)	2 (25%)
	Return home	2 (25%)	19 (76%)
	Walk	0	18 (72%)

Pignat JM, Johr J,C Keranflech, Hömberg V, Laureys S, Frackowiak R, Diserens K. Et al PLOS ONE 2016

Motor Behavior Unmasks Residual Cognition in Disorders of Consciousness

Alessandro Pincherle, MD,^{1,2}
Jane Jöhr, PhD,^{1,2}
Camille Chatelle, PhD,³
Jean-Michel Pignat, MD,^{1,2}
Renaud Du Pasquier, MD,^{1,2}
Philippe Ryvlin, MD, PhD,^{1,2}
Mauro Oddo, MD, PhD,⁴ and
Karin Diserens, MD^{1,2}

**Validation of MBT-r,
N=30 DOC patients**



Ann Neurol 2019;00:1-5



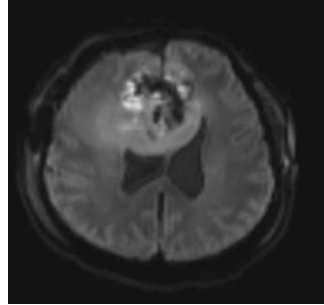
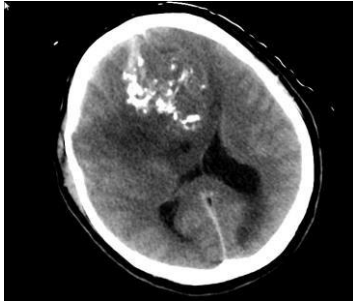
Disorders of consciousness (DOC) are a common consequence of severe brain injuries, and clinical evaluation is critical to provide a correct diagnosis and prognosis.

The revised Motor Behavior Tool (MBT-r) is a clinical complementary tool aiming to identify subtle motor behaviors that might reflect residual cognition in DOC. In this prospective study including 30 DOC patients in the early stage after brain injury, we show that the revised MBT-r has an excellent inter-rater agreement and has the ability to identify a subgroup of patients, underestimated by the Coma Recovery Scale-Revised, showing residual cognition and a subsequent recovery of consciousness.

ANN NEUROL 2019;00:1-5



Trap I: ?



Oligodendrogliome anaplasique stade III,
(CT 15.12.12)

24 after stop of sedation :intensive care



UNITE
NRAH

day 23 NRA unit



ivatic

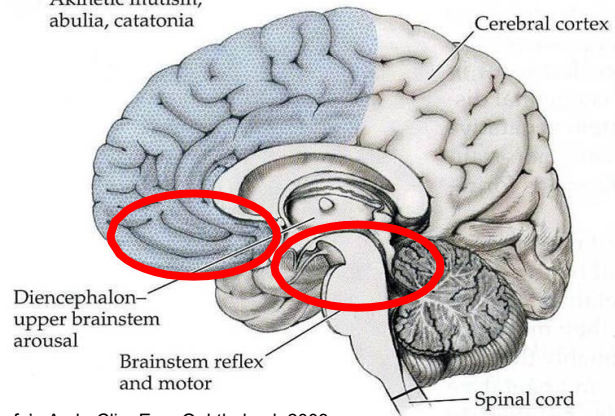


ivatic



Trap I: frontal lesion: akinetic mutism Or / and lid apraxia

Akinetic mutism,
abulia, catatonia



Suzuki Y et al. Graefe's Arch. Clin. Exp. Ophthalmol, 2003
Ishikawa T, Mov Disord, 1995

WV

WV



WV

WV



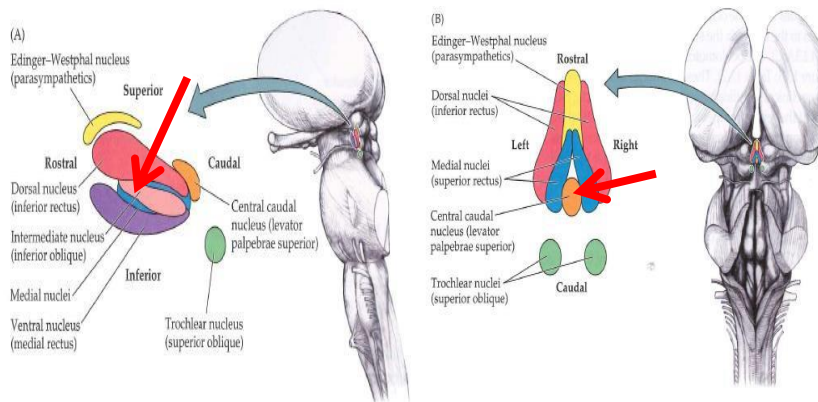
5 months after acute and post-acute neuro-reeducation without adjuvant treatment



ivatic



Trap II: trunk lesion with oculomotor paresis and Bilateral Ptosis



Warwick R. J Comp Neurol 1953;98:449-504

ivatic



Lesion of III: nuclear or nerve lesion

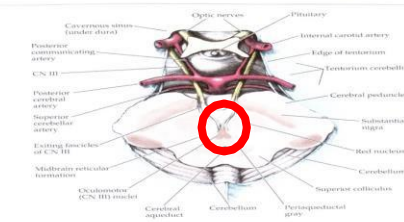
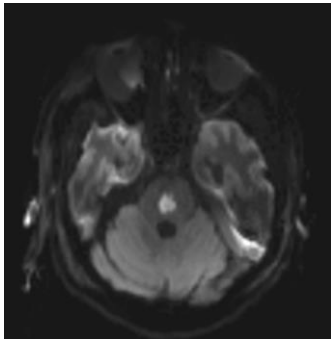


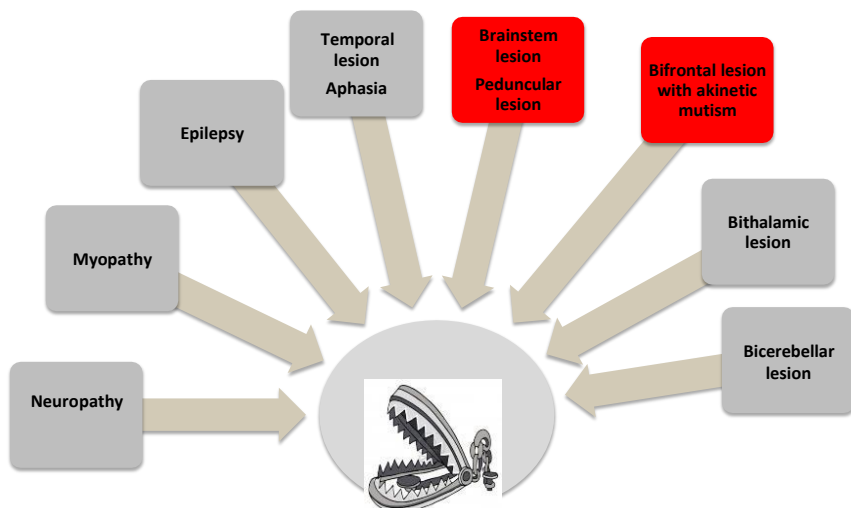
TABLE 13.3 Subnuclei of the Oculomotor Nucleus (CN III) and Their Functions*

SUBNUCLEUS	MUSCLES INNERVATED	SIDE INNERVATED
Dorsal	Inferior rectus	Ipsilateral
Intermediate	Inferior oblique	Ipsilateral
Ventral	Medial rectus	Ipsilateral
Edinger–Weisskopf (parasympathetic)	Pupillary constrictor and lens ciliary muscles	Bilateral
Central caudal	Levator palpebrae superioris	Bilateral
Medial	Superior rectus	Contralateral

ivatic

V

Pitfalls of clinical evaluation



ivatic

HW

Trap III: ?

Admission unité NRA



vitalin



3 weeks later outdoor therapie

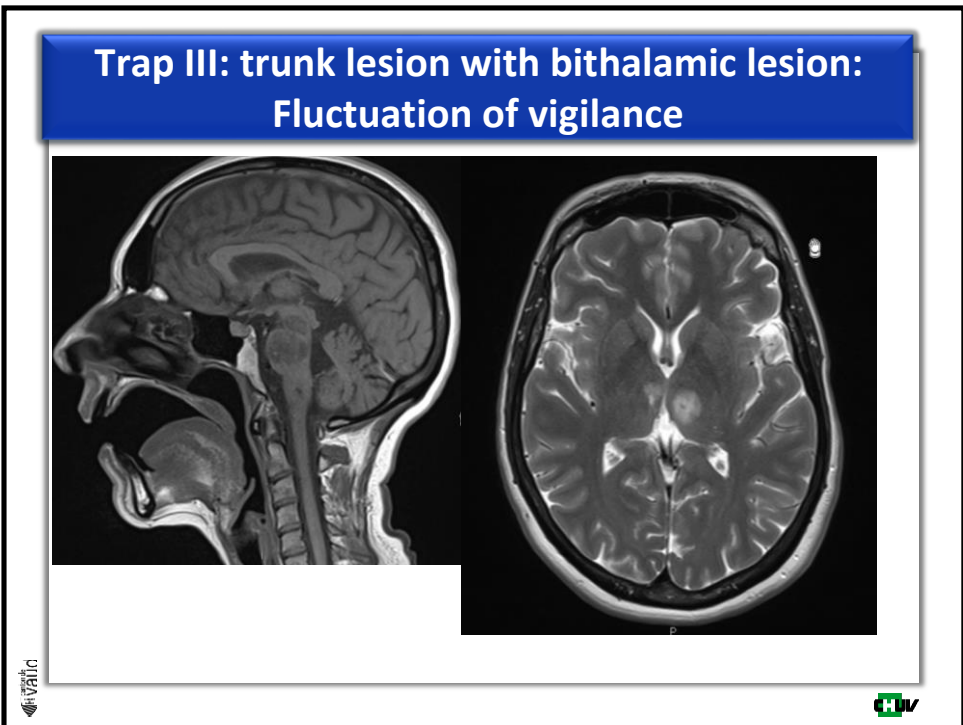


vitalin



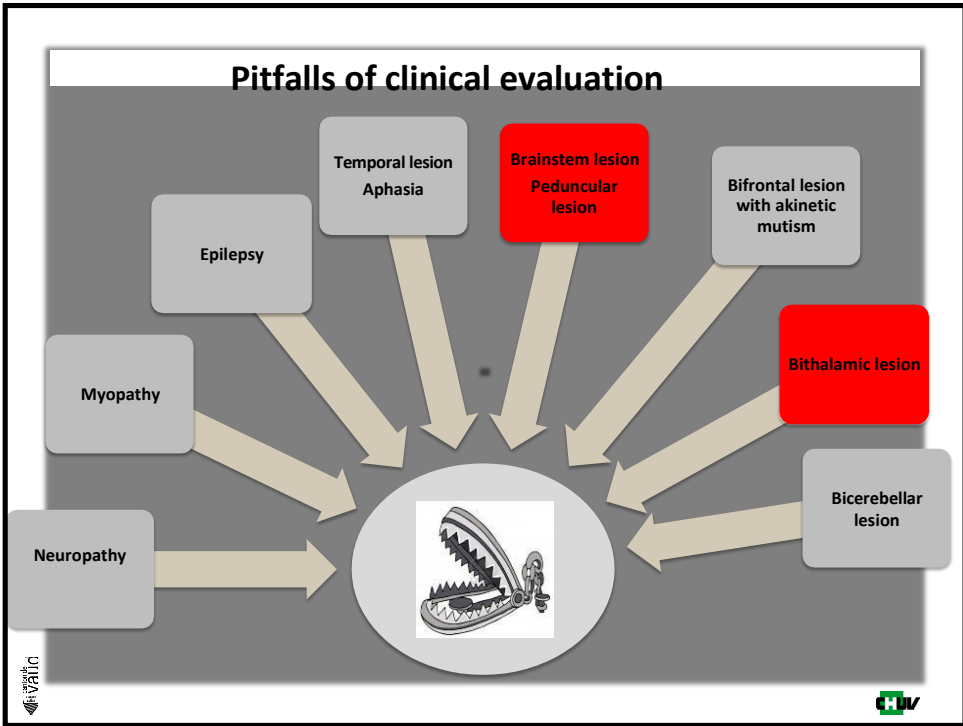


©vatic



©vatic





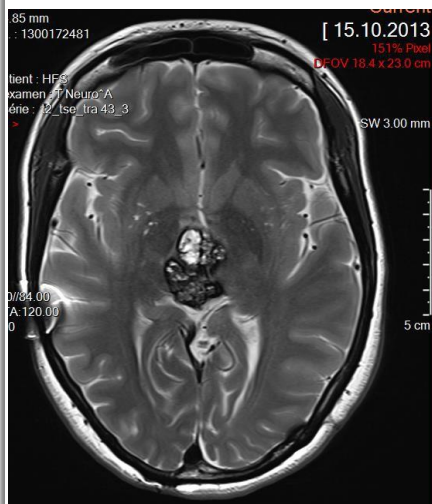
Admission NRA in NRA unit 6 weeks post op



vitalio

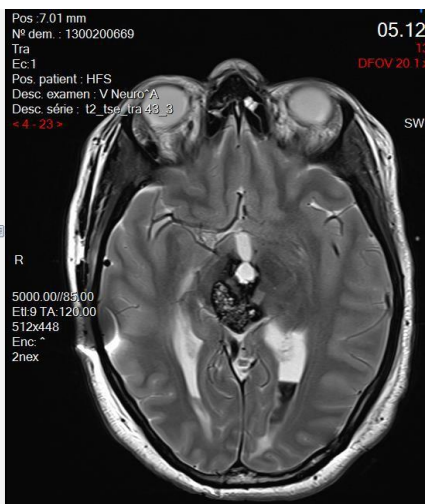


IRM 15.10.13

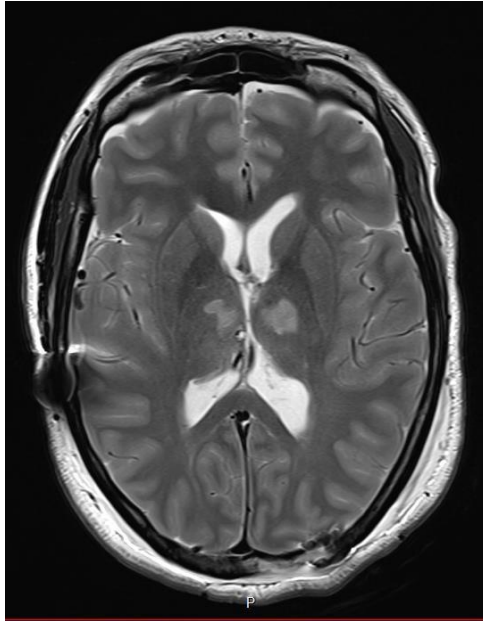


vitalio

post op 05.12.13



IRM
post op
05.12.13



vivatic

CHV



vivatic

CHV

Trap IV: Brain stem lesion + Bithalamic lesion + Myopathy

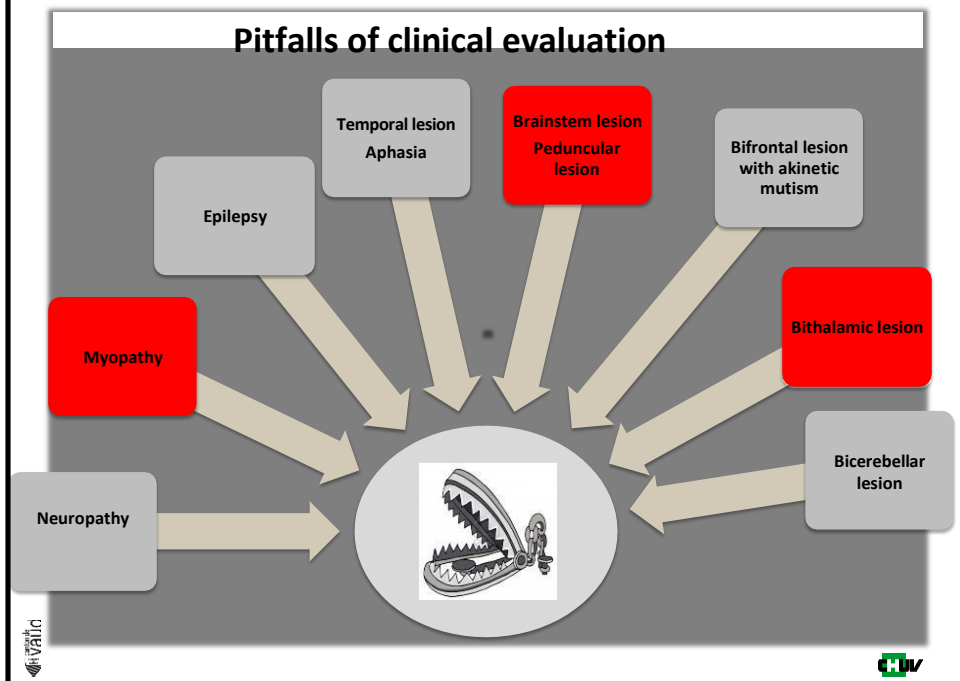
4 months, post op, post acute rehab center



ivatic

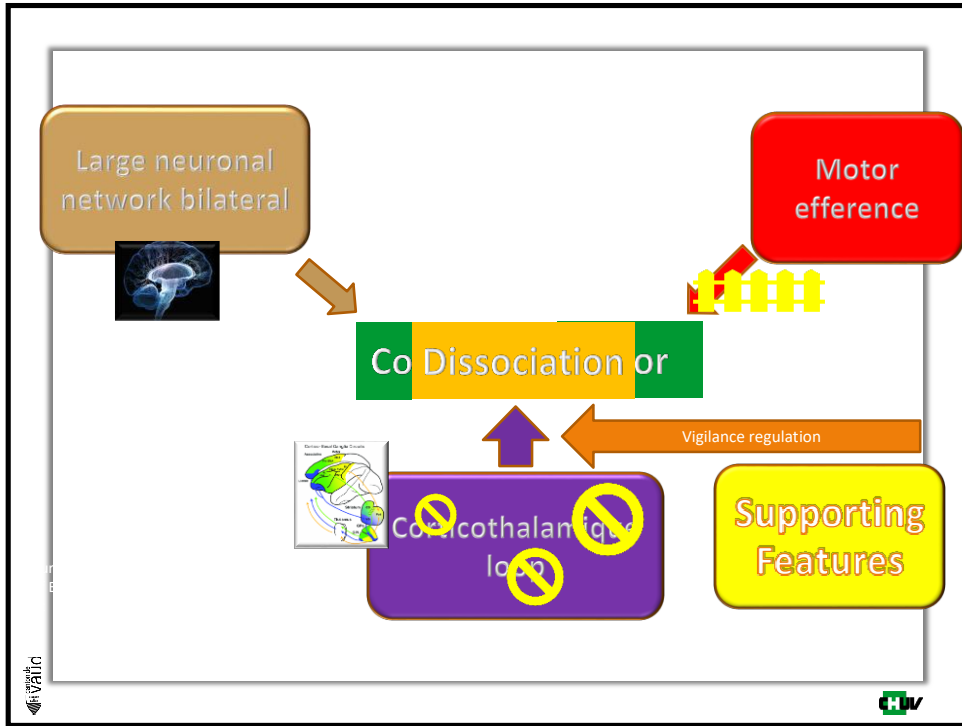


Pitfalls of clinical evaluation



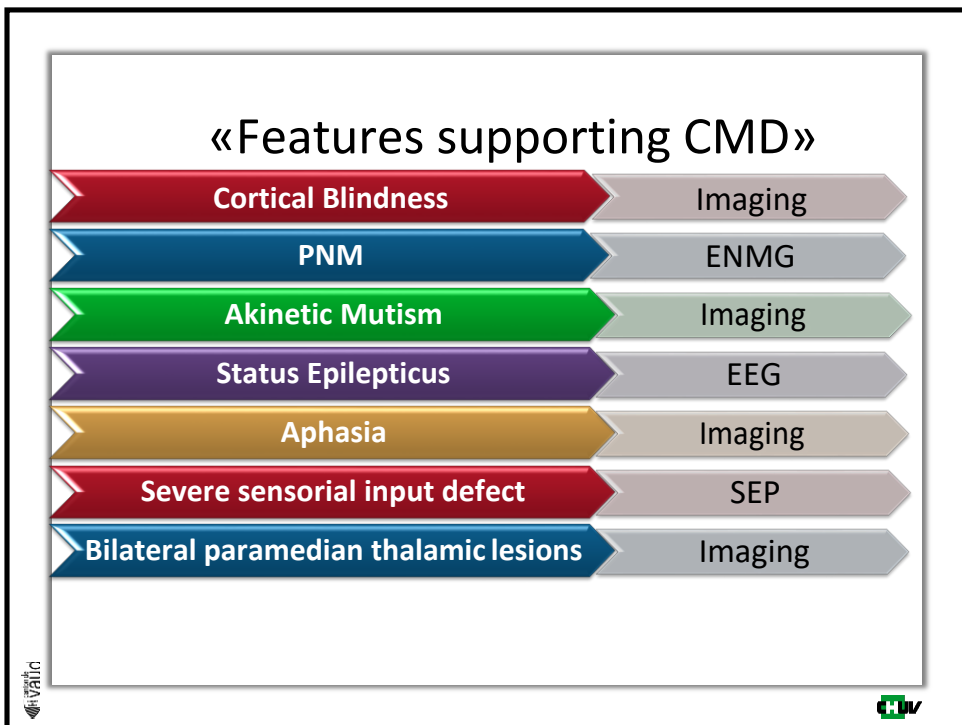
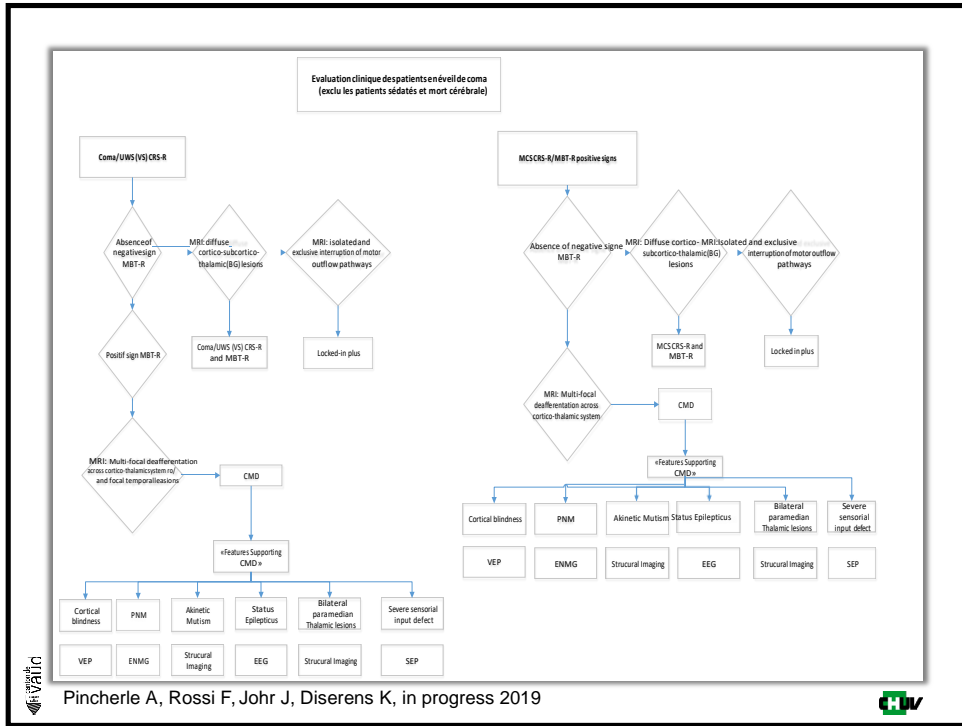
ivatic



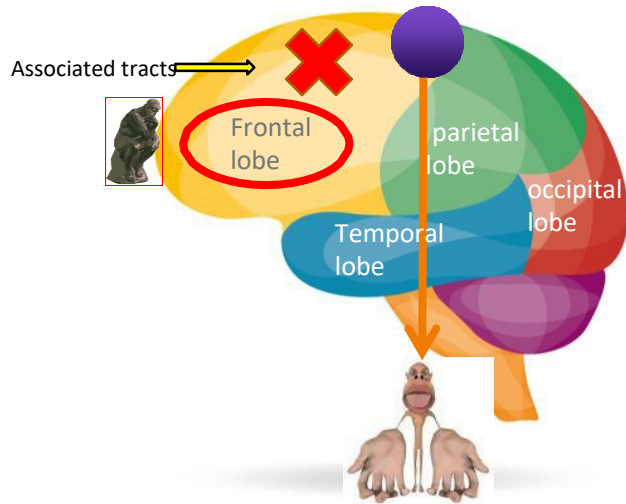


Supporting features (SF) (n=56)	CMD (MBT) (n=40)	DOC (CRS-R/MBT) (n=16)	p-value
Cortical blindness	2 (5)	0	
Polyneuromyopathy	5 (8)	0	
Akinetic mutism	33 (82.5)	0	
Status epilepticus	6 (15)	0	
Aphasia	9 (22.5)	4 (25)	
Severe sensorial input	0	0	
Bilateral paramedian thalamic lesion	2 (5)	1(6.3)	
Locked-in plus	1 (2.5)	0	
Not found	2 (5)	11 (68.8)	

Pincherle A, Rossi F, Johr J, Diserens K, in progress 2019

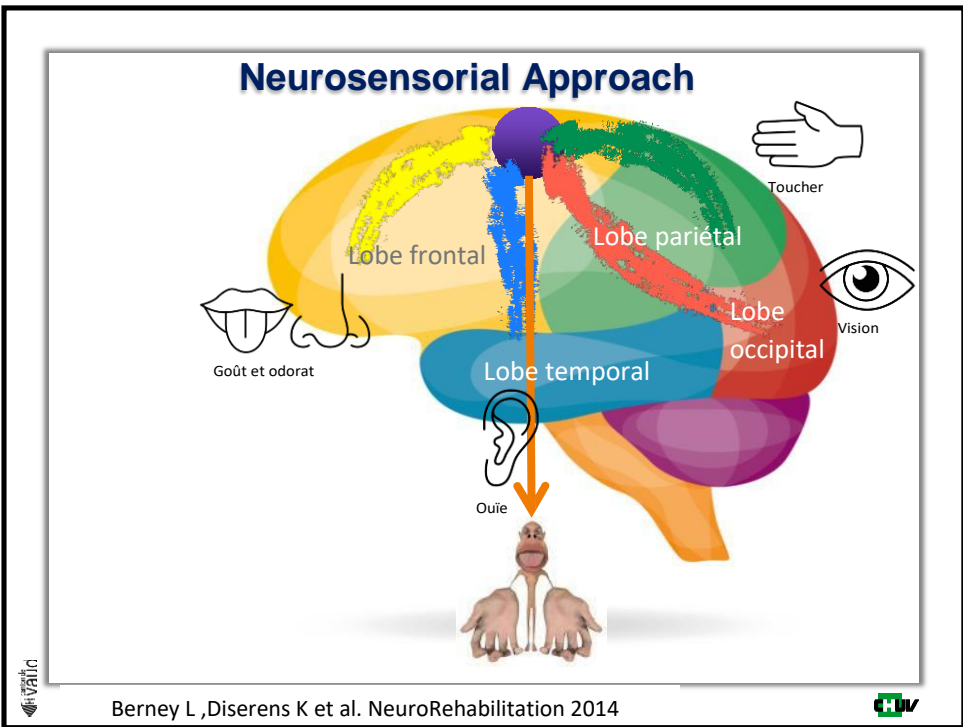


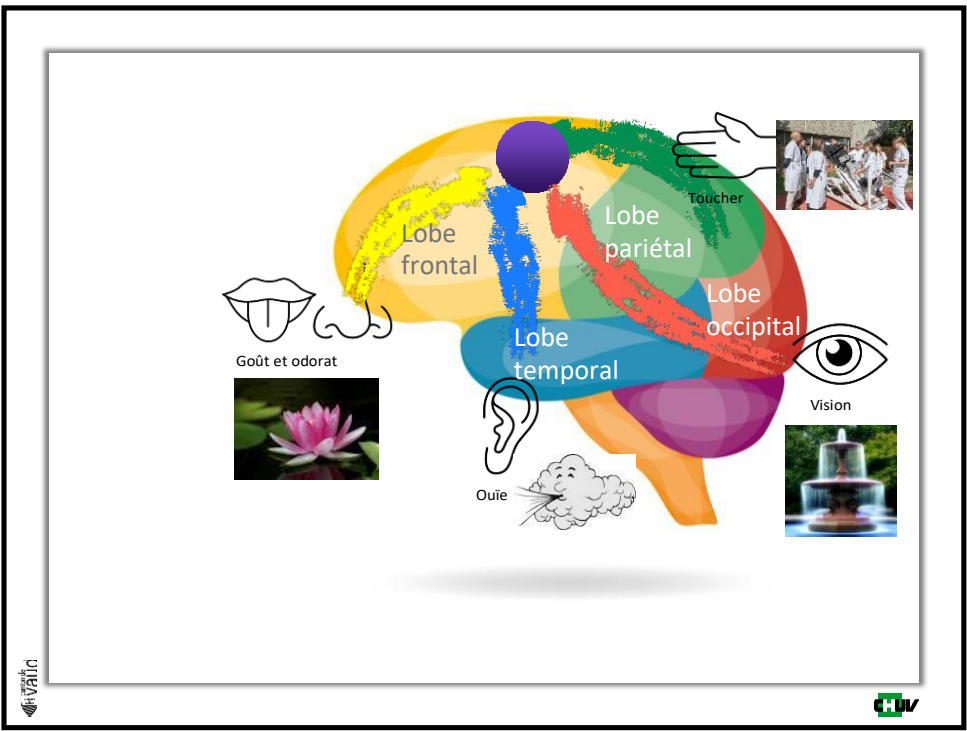
Condition to move: Connectivity



vital

CHV





Role of the limbic system for motricity

Organes sensoriels

↓
Thalamus

↓
Amygdale

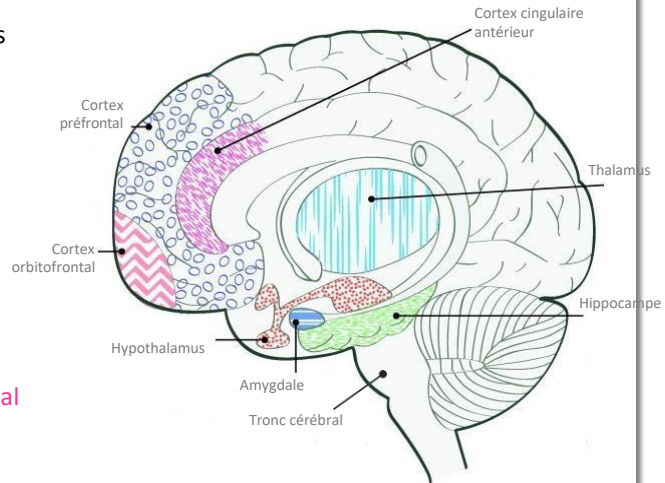
↓
Hypothalamus

↓
Tronc cérébral

↓
Cortex cingulaire

↓
Cortex orbitofrontal

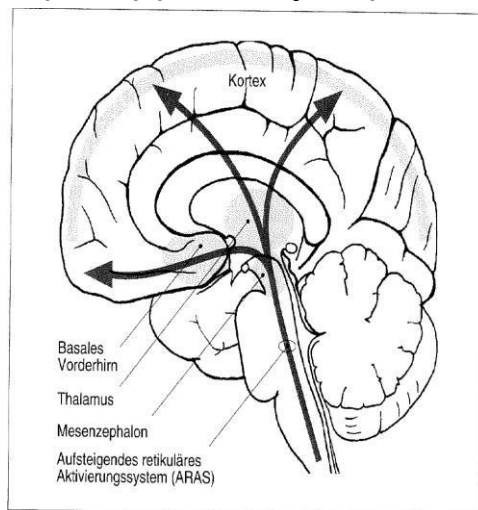
↓
Cortex préfrontal



vivatic



Importance of the input of the Default Mode Network (DMN) (limbic system) for motivation



vivatic





Original Manuscript – Effects of neurosensory approach outdoors _ 20181108

Effect of neurosensory stimulation outdoors on acute patients with covert cognition

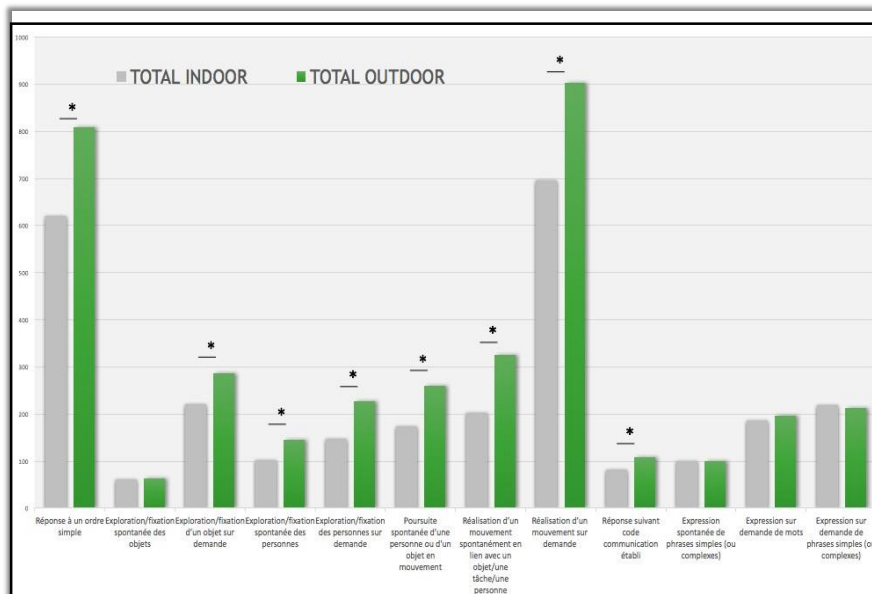
Caroline Attwell^a, Jane Jöhr^a, Alessandro Pincherle^a, Jean-Michel Pignat^a, Krystal Bruyère^a, Nina Kaufmann^a, Jean-François Knebel^{b,c}, Loric Berney^a, Renaud Du Pasquier^a, Philippe Ryvlin^a, Karin Diserens^a

NeuroRehabilitation 2019

International Classification of Functioning, Disability and Health (ICF) : Individual goal assessment

Patient		Juge (initiales)			
		CA	CA	CA	CA
		Date	15.02.2016	15.02.2016	20.02.2016
		Indoor = I ; Outdoor = O	O	I	I
Activités	Séquences	Cotation 1=non			
Faire rouler un ballon, la main droite toujours en contact		2	1		
	1 tendre bras vers partie du ballon	1	1		
	2 entrer en contact	1	1		
	3 faire rouler le ballon	3	1		
	4 relâcher contact	1	1		
Prendre un objet designé				2	2
	1 tendre bras vers l'objet			2	3
	2 Saisir l'objet			2	2
	3 garder min 5"			4	4
	4 relâcher l'objet			3	3

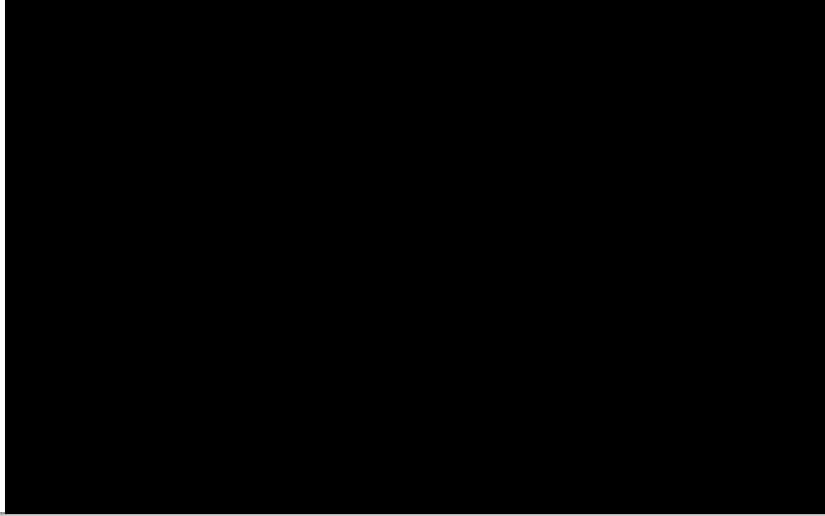
Aviation



Aviation



Indoor



ivatic



Outdoor



ivatic



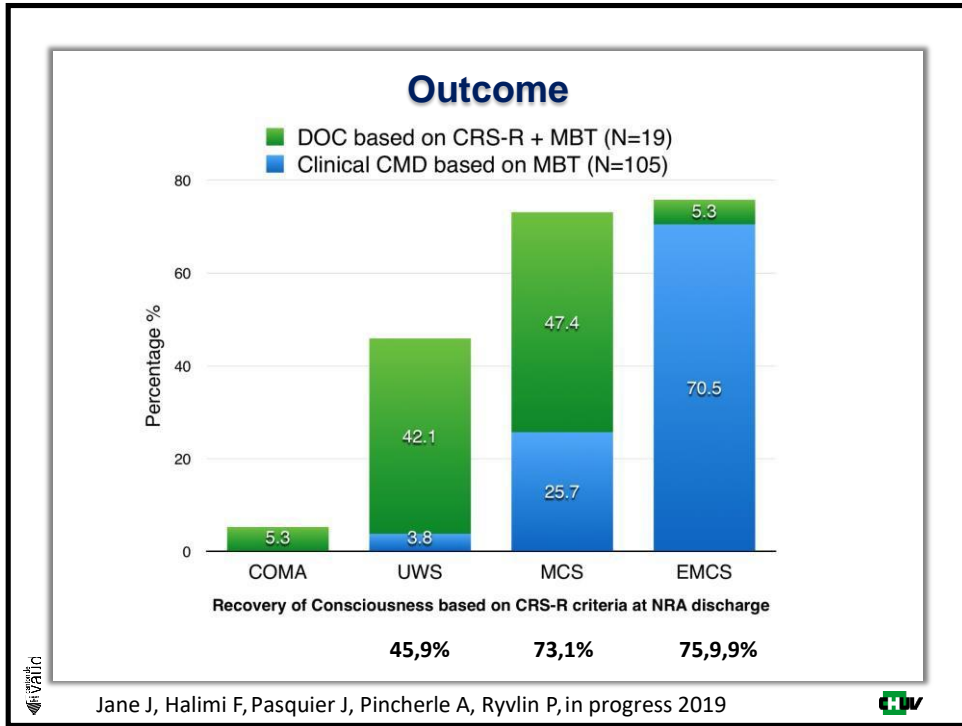
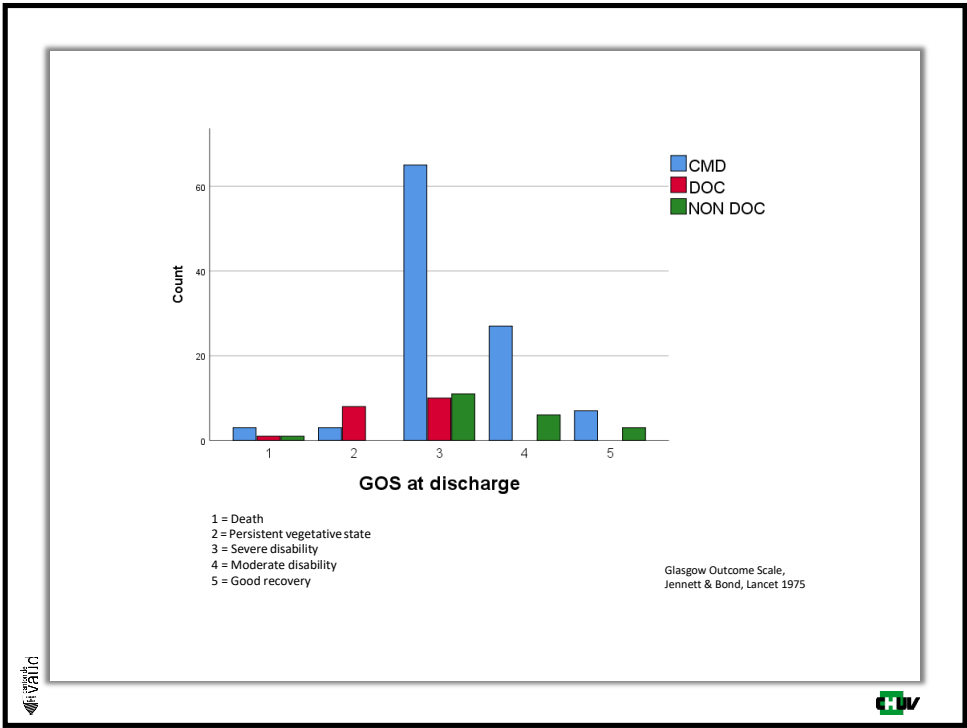


Table 1 – Means (and SD) or distribution of demographic, anamnestic, and clinical outcomes of patients admitted to the Neurorehabilitation Unit between November 2011 and August 2018 (N=145)

	CMD (N=105)	DOC (N=19)	NON-DOC (N=21)
Age (y)	54.4 (16.2)	40.6 (17.8)	54.1 (18.8)
Sex, F/M	39/66	11/8	6/15
Aetiology			
TBI	40	11	3
Hemorrhagic	37	4	6
Ischemic	10	-	5
Anoxic	9	3	1
Toxic/Tumoral/Other	4/5/-	1/-/-	1/-/5
Clinical diagnosis per CRS-R			
Coma	21	6	na
UWS	40	11	na
MCS	44	2	na
Recovery of consciousness (per CRS-R), Yes/No	75/30	1/18	na
Outcomes at discharge			
GOS (range 1-5)	3.3 (0.7)	2.5 (10.9)	3.5 (0.9)
ERBI (range -325 -- +100)	-19.2 (108.9)	-222.6 (92.2)	17.1 (75.2)
mRS (range 1-6)	3.8 (1.0)	4.8 (0.5)	3.6 (1.0)
DRS (range 0-29)	10.7 (6.7)	22.8 (4.0)	6.6 (3.9)
LCF (range 1-10)	6.6 (1.9)	2.6 (1.1)	7.4 (1.7)
FAC (range 0-5)	1.3 (1.3)	0.1 (0.2)	1.5 (1.3)

Jane J, Pincherle A, Rossi F, Diserens K submitted 2018



GLASGOW OUTCOME SCALE

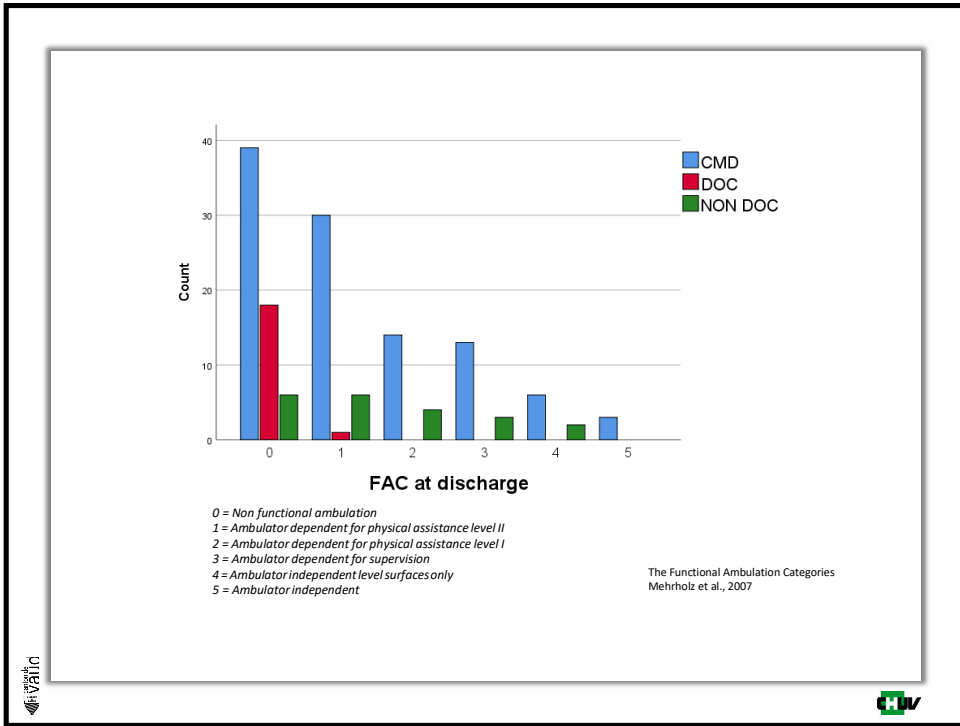
Patient Name: _____
 Rater Name: _____
 Date: _____

Note: The scale presented here is based on the original article by Jennett and Bond. It has become common practice in clinical trial administration, however, to use a modified version that places the scores in reverse order (i.e., "good recovery" = 1, "moderate disability" = 2, etc.).

Score	Description
1	DEATH
2	PERSISTENT VEGETATIVE STATE Patient exhibits no obvious cortical function.
3	SEVERE DISABILITY (Conscious but disabled). Patient depends upon others for daily support due to mental or physical disability or both.
4	MODERATE DISABILITY (Disabled but independent). Patient is independent as far as daily life is concerned. The disabilities found include varying degrees of dysphasia, hemiparesis, or ataxia, as well as intellectual and memory deficits and personality changes.
5	GOOD RECOVERY Resumption of normal activities even though there may be minor neurological or psychological deficits.

TOTAL (1-5): _____

Glasgow Outcome Scale,
Jennett & Bond, Lancet 1975



Appendix—Description of Functional Ambulation Category (FAC)

FAC	Ambulation Description	Definition
0	Nonfunctional ambulation	Subject cannot ambulate, ambulates in parallel bars only, or requires supervision or physical assistance from more than one person to ambulate safely outside of parallel bars
1	Ambulator-Dependent for Physical Assistance Level II	Subject requires manual contacts of no more than one person during ambulation on level surfaces to prevent falling. Manual contacts are continuous and necessary to support body weight as well as maintain balance and/or assist coordination
2	Ambulator-Dependent for Physical Assistance Level I	Subject requires manual contact of no more than one person during ambulation on level surfaces to prevent falling. Manual contact consists of continuous or intermittent light touch to assist balance or coordination
3	Ambulator-Dependent for Supervision	Subject can physically ambulate on level surfaces without manual contact of another person but for safety requires standby guarding on no more than one person because of poor judgment, questionable cardiac status, or the need for verbal cueing to complete the task.
4	Ambulator-Independent Level Surfaces only	Subject can ambulate independently on level surfaces but requires supervision or physical assistance to negotiate any of the following: stairs, inclines, or non-level surfaces.
5	Ambulator-Independent	Subject can ambulate independently on nonlevel and level surfaces, stairs, and inclines.

Mehrholtz et al. (2007) Arch Phys Med Rehabil

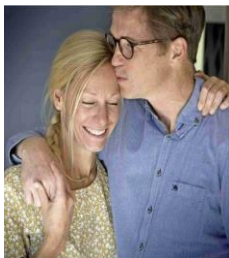
cut-off

2Y post TBI



**« JE SUIS CONTENT
D'ÊTRE VIVANT.
MAIS RIEN N'EST
PLUS ÉVIDENT »**

Il y a deux ans, Olivier Grandjean a subi un traumatisme crânien. Après des semaines de coma, il a dû réapprendre à parler, lire et écrire. Pris en charge au CHU de Paris à la clinique de la SCVA, il témoigne de son retour à la vie grâce à la science.



M. G

M.D

vitalin

CHU

1 y later : cave: brainstem versus cortical lesion



vitalin

CHU

