prognosis is possible within the first 6 weeks, no decision about ongoing of active treatment programme in the first 6 months can be accepted.
Any discussion about a preterm ending of neurorehabilitation is not acceptable, from a neurological point of view and the ethical demands.

3.3

Outcome of intensive rehabilitation program in patients with severe brain injury

S.*M. Capomolla,* G. *Di lasi, M. Storti, P Trovato, A. Delli Gatti,* C. *Joanna,* G. *Storti, L. Metallo, M. Colella,* S. *R. Brancaccio; Polo Specialistico Riabilitativo - Fondazione Don Carlo Gnocchi On/us, Sant'Angelo Dei Lombardi, Italy.*

INTRODUCTION: The incidence and prevalence of brain injury secondary *to* trauma or cardiovascular causes are clearly increasing in industrialized countries. Recent data point out how comprehensive management strategies can improve outcomes in brain injury and thus make resource consumption more effective. OBJECTIVE: To evaluate the outcome of comprehensive intensive rehabilitation program in Severe brain injury rehabilitation Unit. METHODS: We performed a prospective observational cohort study of all patients with severe brain injury admitted to Severe brain injury rehabilitation Unit. Data collected included demographics, brain injury etiology, length of stay in intensive care Unit, vital signs and infections. Biochemical, hematological parameters and devices were measured during management. Functional outcome was measured by Barthel index scale. RESULTS: 154 patients (M/F: 102/52 ; years 59±17) with severe brain injury were evaluated. This disorder was causes by anoxia(24 pts(15%)), trauma (32 pts(21%)) and vascular incident (98 pts(64%)). 34/154(22%) of patients died during intensive rehabilitation. 115/154(75%) patients experimented 213 infection episodes which required 3470 days of antibiotics treatment (22±23 days/pts). The emergency management was performed in 75/154(48%) of patients. Of the variables used in the logistic regression analysis device number - OR 3 (1-10) p<0.002 - serum albumin level - OR 0,1(0,1-0,7) p<0.01, Glasgow Coma Scale -OR 0,59(0,39-0,59) p<,0001 and infections number -OR 3(1-7)p<0,0001 are related with inpatients mortality. CONCLUSIONS: The rehabilitative program can be modified the clinical natural history .The degree of consciousness, metabolic state , device supports and infections are related hard events.

3.4

Ethical and Cultural Consideration in Brain Injury Rehabilitation

S.*A. Wasti;*
Sheikh Khalifa Medical City, Abu Dhabi, United Arab Emirates.

Ethical and cultural considerations in rehabilitation are often overlooked, yet the impact of ethical and cultural factors on rehabilitation outcome is immense. The issues such as decisional disempowerment , decisional surrogacy, consent, intervention futility, end of life management of severely disabled, food likes and dislikes, personal care habits, ritualized religious and cultural beliefs invariably influence therehabilitation programme planning and final outcome. In no other area of rehabilitation are these factors more significant than in brain injury rehabilitation. I propose a floor presentation on this subject. The presentation shall introduce and highlight the following:

1. Ethics and its practical implications in Brain Injury Rehabilitation
   a. Consent
   b. Evaluation of decisional capacity
   c. Surrogate decision making
   d. Empowerment and disempowerment
   e. Devolution of decision making
   f. End of life care of a severely disabled individual due to brain injury (PVS for example)
2. Cultural consideration in Brain Injury Rehabilitation
   a. Family set up and hierarchy
   b. Personal hygiene practices and rituals
   c. Food likes, dislikes, rituals and fads
   d. Food intake routine and practices
   e. Gender to gender contact
   f. Religious practices and rituals
   g. Disability acceptance and taboo
   h. Disability related role change

I am keen to discussed the above in a brain Injury conference as in my capacity as neurorehabilitation physician mainly working with brain injury clients I have learnt to place big emphasis on these factor and would very much like the opportunity to share my experience and thoughts with other colleagues.

3.5

The role of functional MRI in diagnosing severe chronic disorders of consciousness after TBI

S. *M. Golaszewski*[1,2], *M. Seidl*[1] , *A. Kunz*[1], *M. Kronbichler*[3], *J. Bergmann*[3], *J. Crone*[3], *R. Nardone*[4], *E. Trinka*[1,2], *F Gerstenbrand*[5]; [1]*Department of Neurology and Neuroscience Institute, Paracelsus Medical University, Salzburg, Austria,* [2]*Karl Landsteiner Institut für Neurorehabilitation und Raumfahrtneurologie, Wien, Austria,* [3]*Neuroscience Institute, Christian Doppler Clinic, Salzburg, Austria,* [4]*Department of Neurology "Franz Tappeiner" Hospital, Merano, Italy,* [5]*Department of Neurology, Medical University Innsbruck, Innsbruck, Austria.*

Objective: Accurate diagnosis of severe chronic disorders of consciousness (DOC) after TBI is essential for clinical and rehabilitative care and decision-making. Neurobehavioral tests, which rely on the patient's intellectual and motor ability to communicate, are

the most widely used diagnostic tools, since their advantage over clinical assessment has been validated. However, with the emergence of modern neuroimaging methods, especially functional MRI, objective physiological markers for assessing the state of consciousness are available in specialized clinics. They are, however not fully integrated in clinical routine, because their benefit has yet to be determined.
Material and methods: 15 patients in apallic syndrome (AS) and 5 patients in minimally conscious state (MCS) after TBI and other etiologies were examined with somatosensory, auditory and event related paradigms in fMRI and evoked potentials (EP). The findings were compared to the neurobehavioral diagnosis and it was analyzed, if the additional information from fMRI and EP confirmed or questioned the diagnosis.
Results:3 out of 15 patients in AS showed fMRI activation in event related paradigms, suggesting that patients are in MCS or even better.
Conclusion: Uncertainty in diagnosis still exists even with well-established diagnostic assessment scales .As long as internationally accepted guidelines for assessing patients with chronic DOC do not exist, every single diagnostic modality available in each clinical setting should be performed to minimize diagnostic error and to find ways, in terms of perceptive channels, to approach the patients. FMRI has the potential to bring diagnostics in chronic DOC forward to the next level.

Panel Session 4 - Prevention before and after TBI - Adultes and Children

4.2

The shaken baby syndrome (SBS)

A. Laurent-Vannier;
Hopital National de *Saint Maurice, Saint Maurice, France.*

The SSS is a major public health issue, leading to severe long-lasting handicaps.
Mechanism : Violent shaking subjects the infant's head to acceleration, deceleration and rotational forces that create differential movement of the brain, resulting in subdural +1-subarachnoid hemorrhages often associated with hypoxic-ischemic lesions and retinal hemorrhages (75 to 90% of cases). Often, shaking was repeated.
Diagnosis : In its minimal form, SBS consists of subdural haematoma (SDH) without (in 70 to 97% of the cases) any history of accidental injurys reported by the baby's parents or legal guardians or following a minor accident incompatible with the extent of the damage. HSDs are located in multiple areas : inter hemispherically, in the tentorium cerebelli and in the lateral space.
Initial symptoms: The reported mortality rate varies between 15 and 40%.Seizures and decreased alertness (sometimes comas), are the most frequent initial symptoms.
In more than 50% of cases, initial symptoms (apnea, hypotonia, irritability or vomiting) are not specific of a neurological dysfunction.
In more than one third of cases, ecchymosis were found at the first medical evaluation (skull, face. trunk, tongue and more rarely on the limbs).
Sequelae: severe psychomotor development delays, spastic quadriplegia, severe motor disorders, epilepsy, cortical blindness, microcephalus (brain atrophy) can be observed.
This syndrome can occur in any sociocultural milieu and affects children under the age of 12 months old. Most commonly, it affects 3 to 5 month old babies. Boys are always more involved than girls, No explanation is known for this difference.
The best solution is to prevent the shaking. This can be done by explaining to those caring for an infant that if they are exasperated by the baby's crying, they should lie the baby on its back on the bed and leave the room.

4.3

Teleneurorehabilitation - A Way to Improve Prevention *at* Home and Training in Neurological Long Term Rehabilitation

N. Steinhoff [1,2] , *P. Schnider*[1];
[1]*Federal Hospital Lower Austria LK Hochegg, Grimmenstein, Austria,* [2]*Austrian Association for Traumatic Brain Injury, Vienna, Austria.*

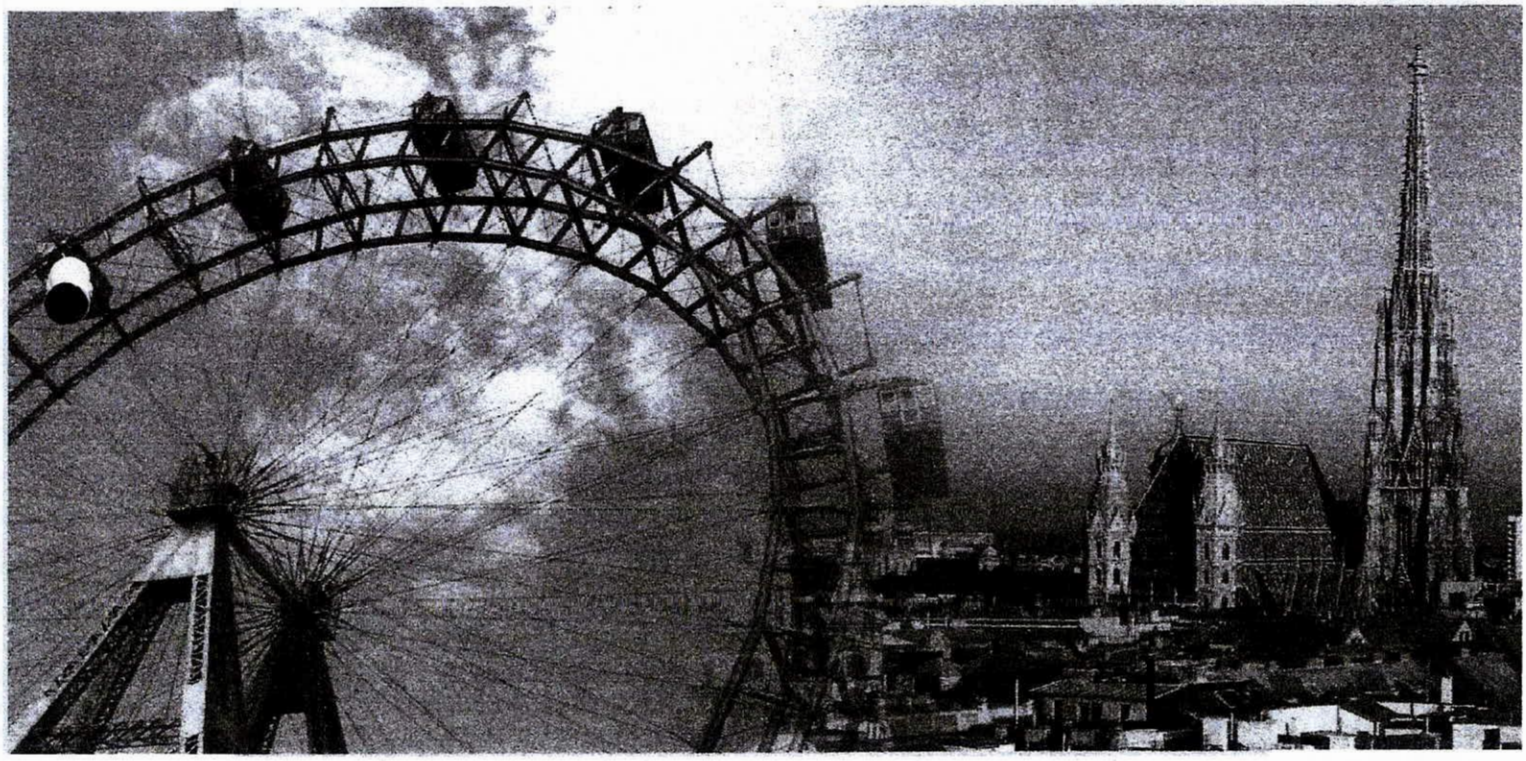
Neurological patients after release from the hospital for long term neurorehabilitation and care at home need intensive medical and social support and training. Several, well known problems emerge for the patients and the caregivers in the organization of this new situation at home to ensure high quality care. Several studies with patients suffering Traumatic Brain Injury and Hypoxic Enzephalopathia, being released at home after long term neurorehabilitation in the hospital were performed. We investigated the feasibility and valence of telemedicine and the technical requirements to overcome the distance between the patient at home and our neurorehabilitational service, regarding the impact on the quality of neurorehabilitation, the situation at home and the acceptance of the patient and caregiver. For this purpose, a video conferencing facility at the patients home and at the hospital were connected via ISDN or ADSL line. Following a protocol (settings for the course of conversation, taking contact, time of conversation, possibility of investigation over a distance, patients data, suggestions for optimising neurorehabilitation and medical therapy and follow up, caregivers support, emerging technical needs in addition to the used particular connection), over a time frame of 8 to 52 weeks telemedical contact was performed with the patient and his caregiver, first daily and consequently at short regular intervals and on demand. The patient had neurological investigation at the beginning and at the end of the study to document possible changes of the physical status. Validated rating scales were used to investigate the acceptance and the influence of Teleneurorehabilitation on the situation at home. The results of this study show that under certain conditions Teleneurorehabilitation can be a potential alternative to the existing systems of long term care, prevention and rehabilitation of neurological patients at home.

BIF European Confederation

SELBST HILFE GRUPPE SCHÄDEL HIRN TRAUMA

Trauma Österreichische Gesellschaft für Schädel-Hirn-Trauma

1st TBI-Challenge.eu 2011



February 23rd to 26th, 2011 in Vienna

BIENNIAL INTERDISCIPLINARY CONFERENCE
of the
BRAIN INJURY AND FAMILIES / EUROPEAN FEDERATION (BIF)
In Cooperation with local and European TBI Associations

ABSTRACT BOOK

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Karl Landsteiner Institute of Neurorehabilitation and Space Neurology

The role of functional MRI in diagnosing severe chronic disorders of consciousness after TBI

SM. Golaszewski[1,4], M. Seidl [1,2], A.B. Kunz[1], M. Kronbichler[1], J. Bergmann [1], J. Crone [1], R. Nardone [3], E. Trinka[1], F. Gerstenbrand[4], Ch. Kurzmann[4]

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1st TBI-Challenge.eu 2011
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Motivation for the study

Patients with severe chronic disorders of consciousness of different origin (TBI, hypoxia, stroke), Apallic Syndrome AS/VS (full state, early remission state I, II - Gerstenbrand 1967), patients in minimally conscious state are misdiagnosed up to 43% (Andrews et al, 1996; Schnakers et al, 2009)

Control procedure:

Bedside testing (neurological examination, Coma Recovery Scale - revised, CRS-R)

EEG (semantic oddball paradigm - SOP, own name paradigm - ONP)

fMRI (SOP, ONP)

Patient epidemiology and etiology of brain damage II

Patient	Etiology	Age	Gender	fMRI delay	CRS-R sum Σ
VS11	BS infarctions	39 years	male	1456 days	2
VS12	T hemorrhage	45 years	male	183 days	2
VS13	Hypoxia & astrocytoma II	38 years	male	66 days	6
VS14	T hemorrhage	38 years	male	344 days	4
VS15	Hypoxia	52 years	female	3 years	6
MCS1	T hemorrhage	77 years	male	33 days	9
MCS2	Hypoxia	19 years	male	95 days	9
MCS3	BS infarctions	59 years	male	86 days	15
MCS4	T hemorrhage	53 years	male	101 days	14
MCS5	T hemorrhage	46 years	male	5 years	8

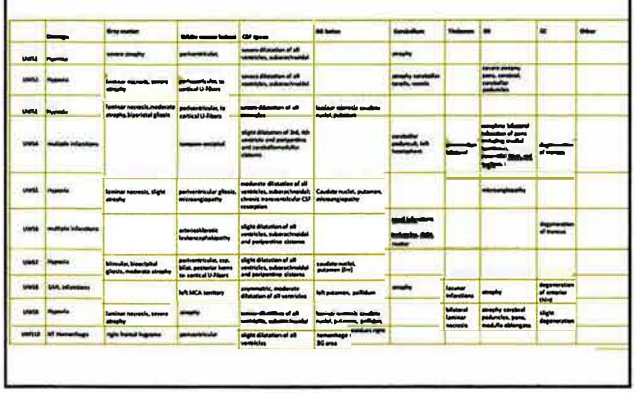
T: traumatic, BS: brainstem

Coma Recovery Scale Revised (CRS-R) in bedside testing (BT)

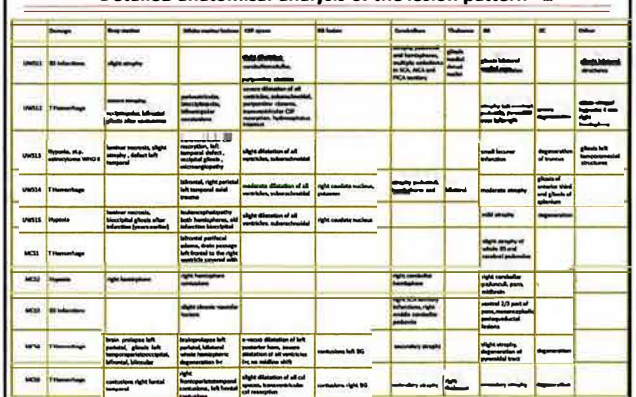
Coma Recovery Scale Revised Score

#	auditory	visual	motor	oromotor	comm.	arousal	total
VS#1	1	0	0	1	0	1.5	3.5
VS#2	1	0	0	0	0	2	3
VS#3	1	1	1	0,5	0	1	4,5
VS#4	1,5	0	2	1	0	0	4,5
VS#5	1	0	0,5	1	0	0	2,5
VS#6	1	0	2	1	0	0	4
VS#7	2	1	2	1	0	1	7
VS#8	1	0	0	1	0	2	4
VS#9	1	0	0	1	0	1	3
VS#10	0	0	1	1	0	1	3
VS#11	0	0	1	1,5	0	0,5	3
VS#12	0,5	0	0,5	0	0	0	1
VS#13	1	1	1	1	0	2	6
VS#14	1	0	1	1	0	1	4
VS#15	1	0	2	1	0	2	6
MCS#1	1	3	1	1	0	3	9
MCS#2	1	2,5	1	1	1	2	8,5
MCS#3	4	3	3	1	1	3	15
MCS#4	2	3	4	2	1	2	14
MCS#5	1	2,5	2	1	0	1,5	8

Detailed anatomical analysis of the lesion pattern - 1



Detailed anatomical analysis of the lesion pattern - 2

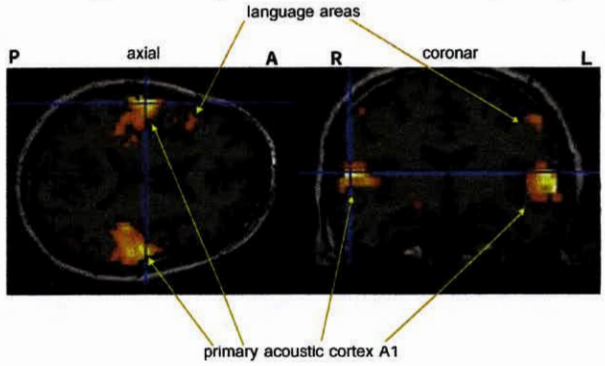


Semantic Oddball paradigm (meaningful versus non-meaningful sentences)

e.g. The sun is hot

e.g. With the ears one can speak

SOP/fMRI: 44 y. old Patient, Locked-In-Syndrome plus severe hypersomnie post Basilar thrombosis 3 years ago



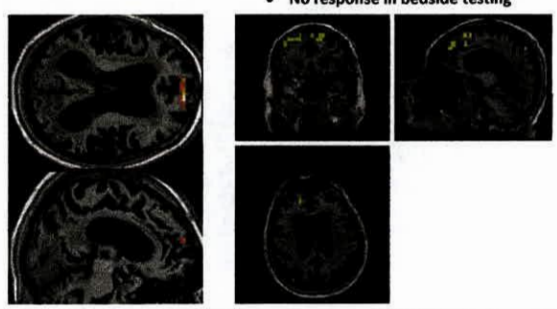
Own name paradigm (own versus other first name)

e.g. Markus, hello Markus ...

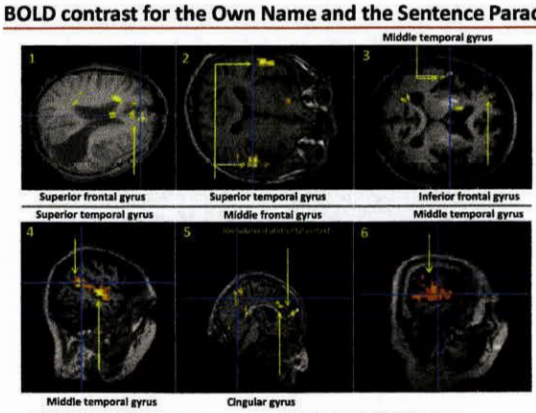
ONP/fMRI: patients

- Patient: 45 y. old
- Basilaris thrombosis 6 mo ago
- No response in bedside testing

- Patient: 50 y. old
- Hypoxic Encephalopathy post cardiac arrest 3 mo ago
- No response in bedside testing



BOLD contrast for the Own Name and the Sentence Paradigma



1) MCS 2: own name > not own name
2) UWS 11: own name > silence
3) UWS 3: sentences > silence
4) UWS 6: meaningful > non-meaningful
5) MCS 3: own name > silence
6) UWS 7: sentences > silence

Functional MRI paradigms: specific responses in 7 patients

Patient	Paradigm	GTs prim L	GTs prim R	GTs Wernicke's L	GTs Wernicke's R	GFi L	GFi R	GFm DLPFC L	GFm DLPFC R	GFs L	GFs R
UWS3	S>R	+				+					
	M>NM										
	O>R										
	O>NO										
UWS4	S>R	+	+		+						
	M>NM		+		+						
	O>R										
	O>NO							+	+	+	+	+
UWS6	S>R	+	+	+	+	+					
	M>NM		+		+		+				
	O>R	+	+	+	+						
	O>NO					+					
UWS11	S>R	+	+	+							
	M>NM										
	O>R	+	+								
	O>NO										
MCS1	S>R	+	+	+	+						+
	M>NM										
	O>R										
	O>NO	+	+	+	+						
MCS2	S>R										
	M>NM										
	O>R	+	+			+					
	O>NO					+	+				
MCS3	S>R	+									
	M>NM										
	O>R	+	+	+	+						
	O>NO										

Specific brain areas:

GTs prim: transvers temporal gyrus

GTs: Wernicke's superior temporal gyrus

GFi: inferior frontal gyrus

GFm DLPFC: middle frontal gyrus, dorsolateral prefrontal cortex

GFs: superior frontal gyrus

GTm: medial temporal gyrus

Contrasts:

S > R: sentences vs rest

M > NM: meaningful vs non meaningful sentences

O > R: own name vs rest

O > NO: own name vs not own name

Funktionelle Neuroanatomie des SP und ONP - 1

fMRI passive listening	Paradigm	GTs prim L	GTs prim R	GTs Wernicke's L	GTs Wernicke's R	Gfi L	Gfi R	GFm DLPFC L	GFm DLPFC R	GFs L	GFs R	Other
UWS2	S>R											
	M>NM					+						
	O>R											
	O>NO											
UWS3	S>R	+				+						
	M>NM											
	O>R											
	O>NO											
UWS4	S>R	+	+		+							
	M>NM		+		+							
	O>R	+	+	+	+							
	O>NO					+		+	+	+	+	left precuneus, left BA 17, left insula
UWS5	S>R	+	+	+	+							
	M>NM											
	O>R	+	+	+	+							
	O>NO											
UWS6	S>R	+	+	+	+	+						right precentral gyrus
	M>NM		+		+		+					
	O>R	+	+	+	+							precuneus, cingular gyrus, BA 17
	O>NO					+						superior parietal lobule, precuneus
UWS7	S>R											
	M>NM											
	O>R	+	+					+	+		+	precuneus, cingular gyrus
	O>NO											
UWS8	S>R		+									
	M>NM											right inferior temporal gyrus
	O>R		+									
	O>NO									+		

Funktionelle Neuroanatomie des SP und ONP - 2

fMRI passive listening	Paradigm	GTs prim L	GTs prim R	GTs Wernicke's L	GTs Wernicke's R	Gfi L	Gfi R	GFm DLPFC L	GFm DLPFC R	GFs L	GFs R	Other
UWS11	S>R	+	+	+								
	M>NM											
	O>R	+	+									
	O>NO											
UWS13	S>R	+										
	M>NM											
	O>R											
	O>NO											
UWS14	S>R	+	+	+	+							
	M>NM											
	O>R	+	+	+	+							BA 17, fusiforme gyrus
	O>NO									+		
MCS1	S>R	+	+	+	+							
	M>NM											
	O>R											left GTm
	O>NO	+	+	+	+							
MCS2	S>R											
	M>NM											
	O>R	+	+			+						
	O>NO					+	+					bilateral medial prefrontal cortex
MCS3	S>R	+										
	M>NM											
	O>R	+	+	+	+							
	O>NO											
MCS4	S>R	+	+	+	+							
	M>NM											
	O>R	+	+	+	+							
	O>NO											
MCS5	S>R	+	+	+	+							
	M>NM											
	O>R	+		+								
	O>NO											

Results I: fMRI/EEG, AS patients in bedside testing

patient number	vibrotactile stimulation	silence vs name	own name vs foreign name	silence vs sentence	semantic oddball
VS#1	no	no	no	no	no
VS#2	no	no	yes	yes	no
VS#3	no	no	no	yes	no
VS#4	yes	yes	yes	yes	yes
VS#5	no	yes	no	yes	no
VS#6	yes	yes	yes	yes	yes
VS#7	no	yes	no	no	no
VS#8	no	yes	yes	yes	yes
VS#9	yes	no	no	no	no
VS#10	yes	no	no	no	no
VS#11	no	yes	no	yes	no
VS#12	yes	no	no	no	no
VS#13	yes	no	no	yes	no
VS#14	no	yes	yes	yes	no
VS#15	no	no	no	no	no

Results II: fMRI/EEG, MCS patients in bedside testing

patient number	vibrotactile stimulation	silence vs name	own name vs foreign name	silence vs sentence	semantic oddball
MCS#1	no	yes	yes	yes	no
MCS#2	no	yes	yes	yes	yes
MCS#3	no	yes	no	yes	no
MCS#4	on	yes	no	yes	yes
MCS#5	no	yes	yes	yes	no

⇒ 8 out of the 15 AS patients in BT diagnosis did show higher order speech processing and cortical response to a self-referential stimulus in fMRI

Discussion

The best possible diagnoses and prognoses as accurate as possible are essential for the justification of medical, legal and ethical reasons for rehabilitation measures as follows:

- Improvement of the rehabilitation result (identification of programs for a possible rehabilitation)
- To give the patient the opportunity to express their condition (e.g. pain, state of mind)
- Give patients the opportunity to express their will (e.g. last will, end of life decisions, etc.)

Conclusion

In unresponsive patients diagnosed as Apallic Syndrome (AS/VS) BT fMRI shows specific brain activity in language regions and regions of self-awareness. EEG shows a differential response to sentences and names. It can be concluded that the diagnosis of AS in BT has to be revised, patients are able for the processing of language, memory and self-referential stimuli at a higher cortical level.

fMRI and EEG showed consistent results.

Knowledge about the perception of language and self-referential stimuli in patients with severe disorders of consciousness is very important for individual planning of neurorehabilitation program and for relatives, caregivers and therapists to improve outcome.

Up to now, we do not have any data for the prognostic value of the detected specific brain activity in fMRI and EEG. Thus, long-term assessment s for AS and MCS patients in BT are needed.


Thank you for your attention!