

Sleep in the vegetative and minimally conscious states



V COLOGAN, M SCHABUS, P MAQUET, S LAUREYS

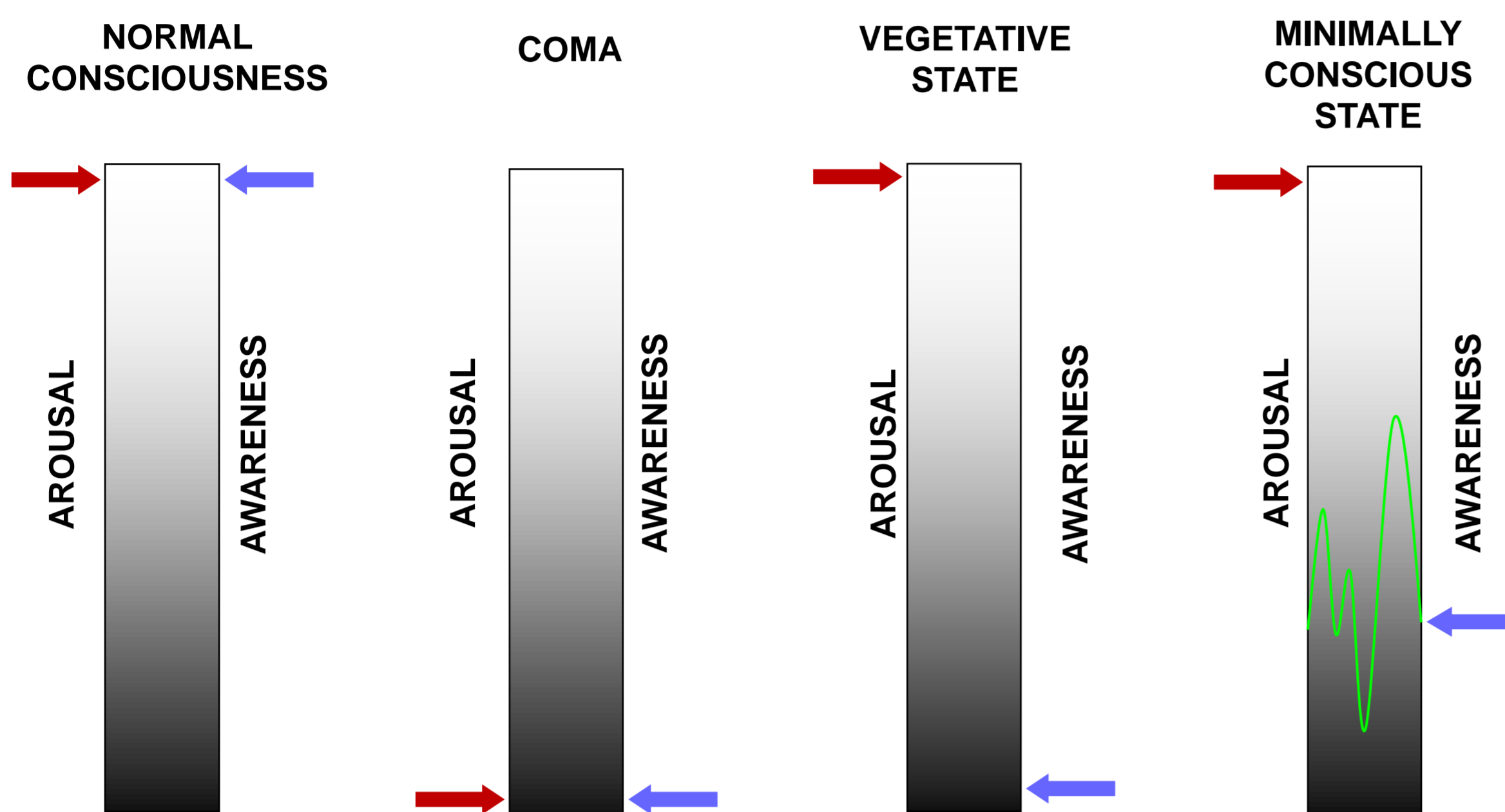
Coma Science Group, Cyclotron Research Centre and Neurology Dept, University of Liège, Belgium

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1. Introduction

Consciousness consists of two components: arousal (wakefulness or level of consciousness) and awareness (content of consciousness).



The two components of consciousness in severely brain injured patients recovering from coma in each clinical entity.

Sleep is a homeostatically and circadian regulated process with clearly defined stages (1) and micro-arousals (2).

2. Problem description

Previous studies in disorders of consciousness (DOC) have reported a wide spectrum of sleep disturbances ranging from almost normal patterns to severe loss and architecture disorganization. The persistence of polysomnographic sleep features is a matter of debate and their diagnosis and prognosis value remain unclear.

Furthermore, it appears that the very existence of sleep and its characterization in DOC is a most challenging issue as these patients do not show the normal behavioral, physiological and regulatory signs of sleep. Most studies used the elder Rechtschaffen & Kales criteria although these rules have important limitations in clinical contexts (3). Finally, the distinction between the vegetative (VS) and minimally conscious (MCS) states was not made meaning that sleep studies might have mixed both entities

3. Methods

We performed 24H polysomnography in 10 VS and 8 MCS patients. They were previously tested several times with the Coma Recovery Scale-Revised (CRS-R) (4). Then, they were followed-up for 6 months and outcome was also determined by the CRS-R score.

5. Conclusion

Cortical synchronization arousals and stage 1 were found in every patients. Other sleep features were found in more MCS than VS patients. Cortical desynchronization arousals, spindles and REM sleep are the best diagnosis markers. Cortical desynchronization arousals are the best VS+ marker. Spindles are the best MCS+ markers. More patients are needed to further investigate the clinical value of the different sleep features.

References

- (1) Rechtschaffen A & Kales A. A manual of standardized terminology, techniques and scoring system for sleep stages of human subjects. *Bethesda, Md.* (1968);
- (2) Halasz P et al. *J Sleep Res* 13(1):1-23 (2004);
- (3) Himanen SL & Assan J. Limitations of Rechtschaffen and Kales. *Sleep Med Rev* 4(2):149-67 (2000);
- (4) Giacino JT et al. The JFK Coma Recovery Scale-Revised. *Arch Phys Med Rehabil* 85: 2020-9 (2004).

4. Results

DETECTION OF SLEEP FEATURES

Circadian pattern : clear difference between the day and night (light off) ocular, muscular & heart activities

Arousals : Halasz et al. (2004) criteria

Stage1 : eyes closed, no markers of other sleep stages (spindles, slow waves, atonia)

Spindles, slow wave sleep & REM sleep : Rechtschaffen & Kales (1968) criteria

DIAGNOSIS

	VS	MCS
Circadian	3 / 10	5 / 10
Cortical desynchro arousal	2 / 10	10/10
Subcortical desynchro arousal	0 / 10	3 / 10
Cortical synchro arousal	ALL	
Subcortical synchro arousal	6 / 10	8 / 10
Stage 1	ALL	
Spindles	3 / 10	6 / 10
Slow wave sleep	3 / 10	8 / 10
REM sleep	3 / 10	10 / 10

PROGNOSIS

	VS-	VS	VS+	MCS	MCS+
Circadian	1 / 3	0 / 3	0 / 2	2 / 3	2 / 4
Cortical desynchro arousal	0 / 3	0 / 3	2 / 2	3 / 3	4 / 4
Subcortical desynchro arousal	0 / 3	0 / 3	0 / 2	2 / 3	2 / 4
Subcortical synchro arousal	2 / 3	2 / 3	0 / 2	3 / 3	4 / 4
Spindles	0 / 3	0 / 3	2 / 2	1 / 3	4 / 4
Slow wave sleep	0 / 3	1 / 3	1 / 2	3 / 3	4 / 4
REM sleep	1 / 3	1 / 3	0 / 2	3 / 3	4 / 4

- : behavioral regression (VS to death)

+ : behavioral progression (VS to MCS or MCS to exit-MCS)

No sign : persistent behavioral state