

Glasgow Liège Scale

One of the most frequently expressed reservations regarding the Glasgow Coma Scale (GCS) has been its failure to incorporate brainstem reflexes. A number of investigators have disagreed with Teasdale and Jennett that spontaneous eye opening is sufficiently indicative of brainstem arousal systems activity and have proposed coma scales that include brainstem responses (Segatore and Way 1992). Many coma scales that include brainstem indicators have been proposed (e.g., the Comprehensive Level of Consciousness Scale (Stanczak et al. 1984), the Clinical Neurologic Assessment Tool (Crosby and Parsons 1989), the Bouzarth Coma Scale (Bouzarth 1968), the Maryland Coma Scale (Salzman et al. 1981)...), but none have known a widespread use. These scales generally have been more complex than the GCS.

A simpler system is the Glasgow Liège Scale (Figure). It was developed in 1982 in Liège and combines the Glasgow Scale with a quantified analysis of five brain stem reflexes: fronto-orbicular, vertical oculocephalic, pupillary, horizontal oculocephalic and oculocardiac (Born et al. 1982). The fronto-orbicular reflex is considered present when percussion of the glabella produces contraction of the orbicularis oculi muscle. The oculocephalic reflexes (doll's head) are scored as present when deviation of at least one eye can be induced by repeated flexion and extension (vertical) or horizontal neck movement (horizontal). If the reflexes are absent or cannot be tested (e.g., immobilized cervical spine), an attempt is made to elicit ocular motion by external auditory canal irrigation using iced water (i.e., oculovestibular reflex testing). With cold-water irrigation of the head at 30° elevation from the horizontal, the eyes deviate tonically toward the ear irrigated (horizontal). When cold water is injected simultaneously into both ears canals, the eyes deviate tonically downwards; the reverse occurs with bilateral irrigation of warm water (vertical). The oculocardiac reflex is scored as present when pressure on the eyeball causes the heart rate to slow down. Like for the GCS, the best response determines the brainstem reflex score (R). The selected reflexes disappear in descending order during rostral-caudal deterioration. The disappearance of the last, the oculocardiac, coincides with brain death. Note that the recently proposed Full Outline of UnResponsiveness (FOUR) (Wijdicks et al. 2005) also evaluates the brainstem reflexes (pupil, cornea and cough reflexes) and separately scores respiration.

R – brainstem reflexes

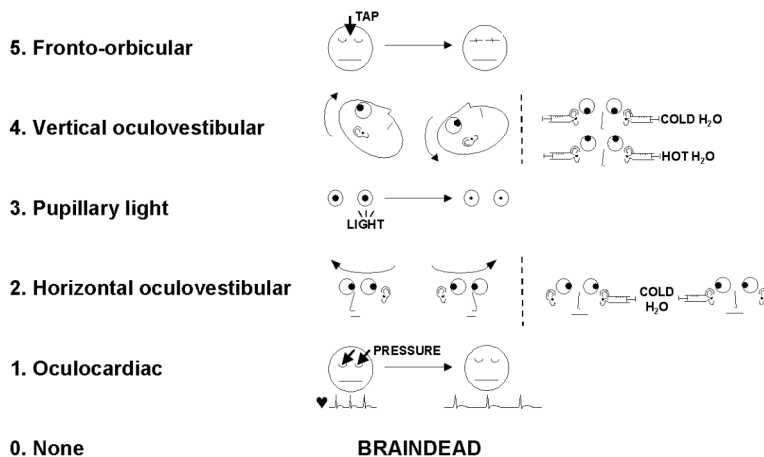


Figure Glasgow-Liège Scale (GLS, Born et al. 1982). Note: when oculocephalic reflexes (doll's eyes) cannot be tested or are absent, the (vertical and horizontal) oculovestibular reflexes (ice water testing) should be evaluated. (illustration taken from Laureys et al. 2002)

References (text adapted from Laureys et al. 2002)

- Born, J. D., P. Hans, G. Dexters, K. Kalangu, J. Lenelle, G. Milbouw and A. Stevenaert (1982). "Practical assessment of brain dysfunction in severe head trauma." Neurochirurgie **28**(1): 1-7.
- Bouzarth, W. F. (1968). "Neurosurgical watch sheet for craniocerebral trauma." J Trauma **8**(1): 29-31.
- Crosby, L. and L. C. Parsons (1989). "Clinical neurologic assessment tool: development and testing of an instrument to index neurologic status." Heart Lung **18**(2): 121-9.
- Laureys, S., S. Majerus and G. Moonen (2002). Assessing consciousness in critically ill patients. 2002 Yearbook of Intensive Care and Emergency Medicine. J. L. Vincent. Heidelberg, Springer-Verlag: 715-727.
- Salcman, M., R. S. Schepp and T. B. Ducker (1981). "Calculated recovery rates in severe head trauma." Neurosurgery **8**(3): 301-8.
- Segatore, M. and C. Way (1992). "The Glasgow Coma Scale: time for change." Heart Lung **21**(6): 548-57.
- Stanczak, D. E., J. G. White, 3rd, W. D. Gouview, K. A. Moehle, M. Daniel, T. Novack and C. J. Long (1984). "Assessment of level of consciousness following severe neurological insult. A comparison of the psychometric qualities of the Glasgow Coma Scale and the Comprehensive Level of Consciousness Scale." J Neurosurg **60**(5): 955-60.
- Wijdicks, E. F., W. R. Bamlet, B. V. Maramattom, E. M. Manno and R. L. McClelland (2005). "Validation of a new coma scale: The FOUR score." Ann Neurol **58**(4): 585-93.