

## Chronic "brain death" (D. Alan Shewmon, MD)

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### Meta-analysis and conceptual consequences

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Address correspondence and reprint requests to D. Alan Shewmon, MD, Department of Pediatrics, Division of Neurology, UCLA Medical Center, MDCC 22-474, Box 951752, Los Angeles, CA 90095-1752. **Objective:** One rationale for equating "brain death" (BD) with death is that it reduces the body to a mere collection of organs, as evidenced by purported imminence of asystole despite maximal therapy. To test this hypothesis, cases of prolonged survival were collected and examined for factors influencing survival capacity.

**Methods:** Formal diagnosis of BD with survival of 1 week or longer. More than 12,200 sources yielded approximately 175 cases meeting selection criteria; 56 had sufficient information for meta-analysis. Diagnosis was judged reliable if standard criteria were described or physicians made formal declarations. Data were analyzed by means of Kaplan-Meier curves, with treatment withdrawals as "censored" data, compared by log-rank test.

**Results:** Survival probability over time decreased exponentially in two phases, with initial half-life of 2 to 3 months, followed at 1 year by slow decline to more than 14 years. Survival capacity correlated inversely with age. Independently, primary brain pathology was associated with longer survival than were multisystem etiologies. Initial hemodynamic instability tended to resolve gradually; some patients were successfully discharged on ventilators to nursing facilities or even to their homes.

**Conclusions:** The tendency to asystole in BD can be transient and is attributable more to systemic factors than to absence of brain function per se. If BD is to be equated with death, it must be on some basis more plausible than loss of somatic integrative unity.