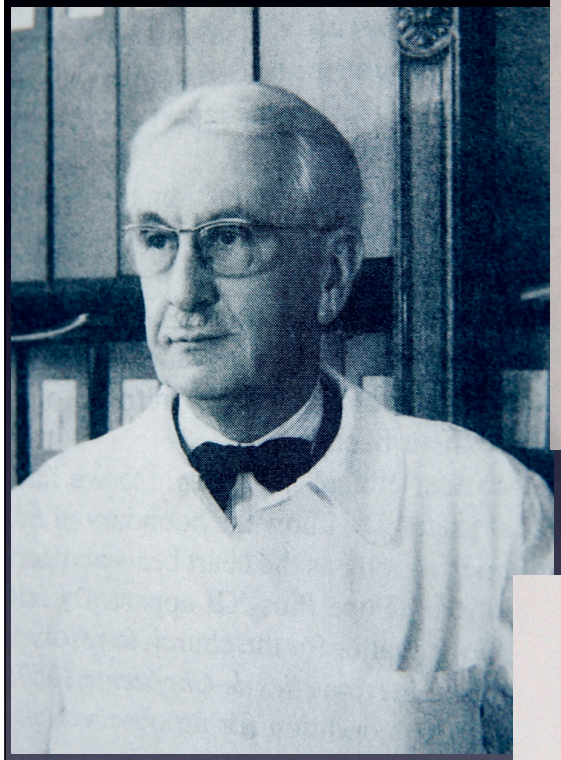
‘Levende lijken’
Opmerkelijke verschijnselen bij hersendode patienten

Erwin J.O. Kompanje
ICV Erasmus MC Rotterdam

Le Coma depasse (1959)



Tome 101. — N° 2. 1959

REVUE NEUROLOGIQUE

MÉMOIRES ORIGINAUX

NÉCROSES MASSIVES DU SYSTÈME NERVEUX CENTRAL
DANS UNE SURVIE ARTIFICIELLE *

PAR MM.

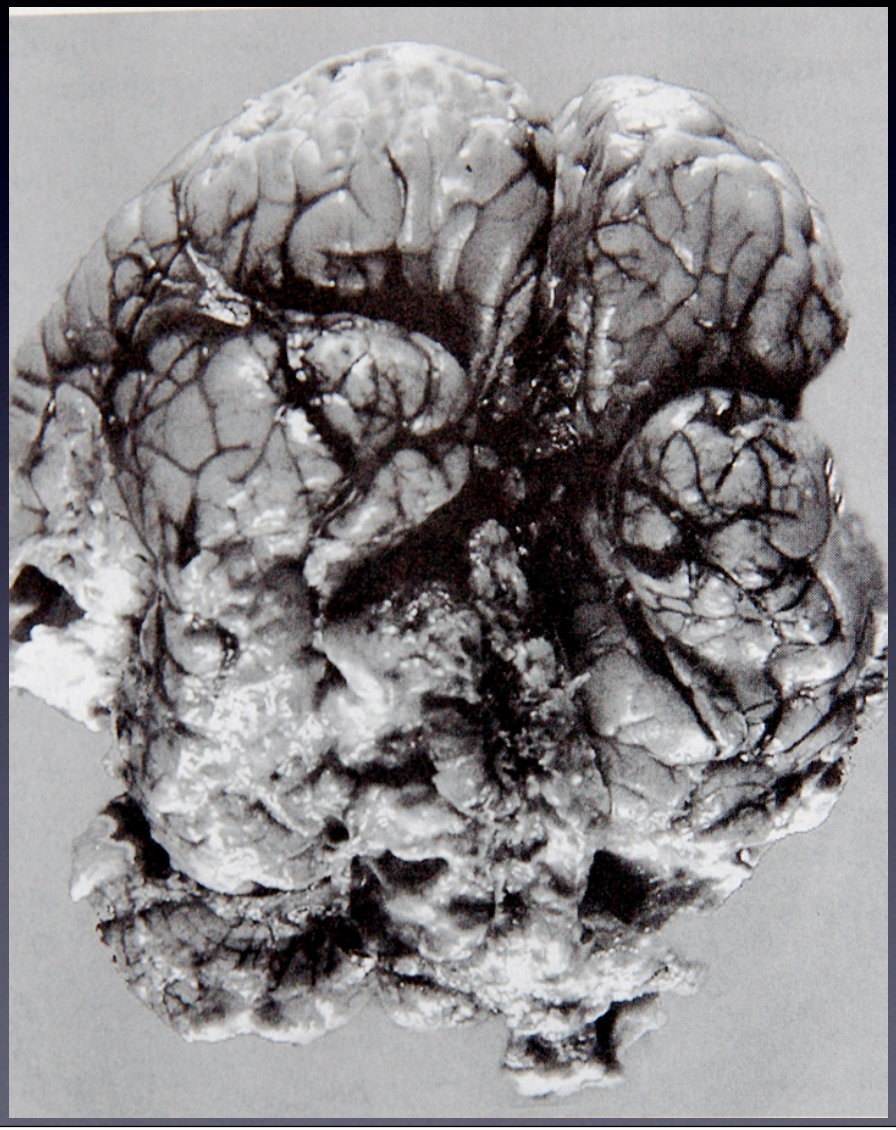
Ivan BERTRAND, François LHERMITTE, Bernard ANTOINE
et Henri DUCROT

COMA DÉPASSÉ
ET NÉCROSES NERVEUSES CENTRALES MASSIVES

PAR MM.

P. MOLLARET, Ivan BERTRAND et M^me^ H. MOLLARET

Necroses Massives du Systeme nerveux central
('Respirator brain')



August 1968, Harvard criteria

JAMA 1968; 205: 85

A Definition of Irreversible Coma

Report of the Ad Hoc Committee of the Harvard Medical School to Examine the Definition of Brain Death

JAMA, Aug 5, 1968 • Vol 205, No 6

Our primary purpose is to define irreversible coma as a new criterion for death. There are

these comatose patients. (2) Obsolete criteria for the definition of death can lead to controversy in obtaining organs for transplantation.

Reference

1. Pius XII: The Prolongation of Life, *Pope Speaks* 4:393-398 (No. 4) 1958.

Aandoeningen die aan hersendood voorafgaan

Analyse van 71 gepubliseerde series [1968-2008]

n= 6317 patienten

83% = SAB (c.60%), tSHL (c.15%),

ICH (c.8%)

E.J.O. Kompanje, *Organ donation from Brain-dead donors: A dead end street.* In: Human Rights and Medicine, Maklu, 2010

Is Organ Donation From Brain Dead Donors Reaching an Inescapable and Desirable Nadir?

Erwin J.O. Kompanje, Yorick J. de Groot, and Jan Bakker

(*Transplantation* 2011;91: 1177–1180)

TABLE 1. Comparing effectuated DCD and DBD in different eras in The Netherlands over the past 15 yr

	Era 1 (1995–1999)	Era 2 (2000–2004)	Era 3 (2005–2009)	*P*[a]
No. of donors	1033	1042	1090	0.695
DBD (% of total number of donors)	915 (88.6)	697 (66.9)	637 (58.4)	0.008
DCD (% of total number of donors)	118 (11.4)	345 (33.1)	453 (41.6)	<0.0001

Hersendood is een *ongewenste*, maar soms onvermijdelijke uitkomst van intensive care behandeling van patienten met ernstige traumatisch schedelhersenletsel of een subarachnoidale bloeding.

Preventie van incidentie en sterfte door een SAB en tSHL maakt dat het voorkomen steeds zeldzamer wordt.

Hersendood is een voor de leek (maar soms ook voor de professional) moeilijk te begrijpen verschijnsel, met name omdat er nog ‘veel tekenen van leven’ zijn.

17 year old Nil'in boy brain dead after being shot at close range by Israeli army

17 year-old Youssef Amira, was shot in the West Bank village of Ni'lin on Wednesday evening after the funerals of 11 year-old killed the day before by the Israeli army and ***is declared brain dead*** in Ramallah hospital, 31/07/2008. Youssef was on his way to visit his uncle when an Israeli jeep which was chasing some youth who were throwing stones stopped at his level and opened fire on him at a distance of around 8 meters. He was shot by two rubber coated bullets in his head. The ambulance could not reach him and some Palestinians had to carry him through olive trees fields. ***Doctors in Ramallah hospital declared that his death is a matter of hours***. Photo by: Anne Paq/Activestills.org

PHYSORG.COM
SCIENCE : PHYSICS : TECH : NANO : NEWS

Free Surgery for Boy Ends in Brain Death

In this photo provided by New Ad Age International, INC., Sabit Kurbanov is pictured at St. Anthony Hospital in Oklahoma City, with his son David Kurbanov, in photo dated January, 2007. David Kurbanov traveled halfway around the world so American doctors could remove a brain stem tumor, but the surgery ***left him brain dead***. Now his anguished father is lashing out at surgeons, and ***hoping for a miracle recovery.*** (AP Photo/ Valeriy Tarasov, New Ad Age International, INC.)

Debbie Stoner (11 yrs)

... a heartbroken mother wants you to see the moment she cradled her *dying* daughter for the final time...

De Telegraaf

BUITENLAND

SNELNIEUWS

Woensdag 28 juli

Binnen- en Buitenland RSS

07:18 Dam funest voor reuzenvissen

07:16 Pentagon is 9 miljard 'kwijt'

07:14 Mogelijk verbod op stierenvechten

07:12 Proces doodschieten 15-jarige

07:11 Titanic 'virtueel bergen'

07:09 Afghaanse bus rijdt op bermbom

di 27 jul 2010, 11:00

Vrouw (21) Love Parade op sterven

DUISBURG - Een 21-jarige vrouw ligt drie dagen na het drama op festival Love Parade in Duisburg op sterven. Het dodental als gevolg van massale verdrukking op het dancefeest staat momenteel op twinting mensen.

Volgens de Duitse krant Bild is de vrouw hersendood. Ze ligt in een kliniek in Duisburg. Men houdt er rekening mee dat de vrouw komt te overlijden.

De nationaliteit van het slachtoffer is niet bekend.

Foto: ddp images/Daniel Naupold

Wat testen we bij vaststelling van de hersendood ('whole brain death')?

1. Circa 10% van de cerebrale cortex (surface EEG)
2. Functie van 7 hersenstamzenuwen (nIII, nV, nVI, nVII, nVIII, nIX, nX)
3. Ademhaling drive in het verlengde merg (apneu test)

Wat testen we *niet* bij vaststelling van de hersendood?

1. Circa 90% van de cerebrale cortex (EEG)
2. Functie van 5 hersenstamzenuwen (nI, nII, nIV, nV en nXII)
3. Functie van hypothalamus en diencephalon (zoals metabole processen, interne homeostase, thermoregulatie, hormoonproductie)
4. Homeostase en imuunrespons

Wat doet er *niet* toe bij vaststelling van de hersendood?

1. Functie van het ruggenmerg
2. Functie van het perifere zenuwstelsel
3. Functie van hypothalamus en diencephalon
4. Alle extracerebrale functies, zoals bijvoorbeeld homeostase en imuunrespons

1. ‘Bewegende doden’

2. ‘Doden met intacte homeostase’

3. ‘Zwangere lijken’

1

‘Bewegende doden’

Acta Neurochirurgica 28, 259—273 (1973)

Medical Department B and Neurosurgical Department of Rigshospitalet, Neurosurgical Department, Anesthesiological Department, and The Poison Center of Bispebjerg Hospital, Copenhagen, Denmark
(Director: Prof. dr. med. A. Tybjærg Hansen)

Spinal Man after Brain Death

The Unilateral Extension-Pronation Reflex of the Upper Limb as an Indication of Brain Death*

By

E. O. Jørgensen

Table 2. *Spinal Reflex Activity in 63 Brain Dead Patients*

Reflex activity	N	Appearance time of spinal reflexes in hours					
		o	< 6	6–12	12–24	24–72	> 72
Deep reflexes of the upper limb	— 32						
	+ 31	25	2		1	2	1
Deep reflexes of the lower limb	— 39						
	+ 24	19	1		2	2	
Upper abdominal reflexes	— 61						
	+ 2	2					
Lower abdominal reflexes	— 56						
	+ 7	2	1	1	1	2	
Cremasteric reflex	— 41*						
	+ 22	14	2	2	1	3	
Priapism	— 58*						
	+ 5		2	1	1	1	
Flexion-withdrawal reflex	— 13						
	+ 50	28	12	3	5	1	1
Extension-pronation reflex	— 42						
	+ 21			3	7	9	2

— Absent, + Present, * 29 females.

J Korean Med Sci 2006; 21: 588-90
ISSN 1011-8934

■ BRIEF COMMUNICATION ■

Reflex Movements in Patients with Brain Death: A Prospective Study in A Tertiary Medical Center

Reflex movements have been reported to occur in up to 75% of brain-dead patients, but this issue has not been addressed in Korea. The patients admitted to our hospital who met the criteria for brain death were enrolled between March 2003 and February 2005. The frequency and type of reflex movements in these patients were evaluated prospectively using a standardized protocol. Brain death was determined according to the guideline of Korean Medical Association. Of 26 patients who were included, five (19.2%) exhibited reflex movements such as the pronation-extension reflex, abdominal reflex, flexion reflex, the Lazarus sign, and periodic leg movements. This finding suggests that the frequency of spinal reflex movements is not rare and the awareness of these movements may prevent delays in brain-dead diagnosis and misinterpretations.

Key Words : *Brain Death; Reflex, Abnormal; Organ Transplantation*

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Department of Neurology, Samsung Medical Center, Sungkyunkwan University School of Medicine, Seoul, Korea

Received : 25 August 2005
Accepted : 23 November 2005

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European Journal of Neurology 2000, **7:** 315–321

Phenomenological diversity of spinal reflexes in brain death

J. F. Spittler[a], D. Wortmann[b], M. von Düring[c] and W. Gehlen[a]

[a]*Department of Neurology,* [b]*Department of Anaesthesiology and* [c]*Department of Neuroanatomy, Ruhr-University Bochum, Bochum, Germany*

Table 1 Types of spinal reflexes and automatisms in brain death

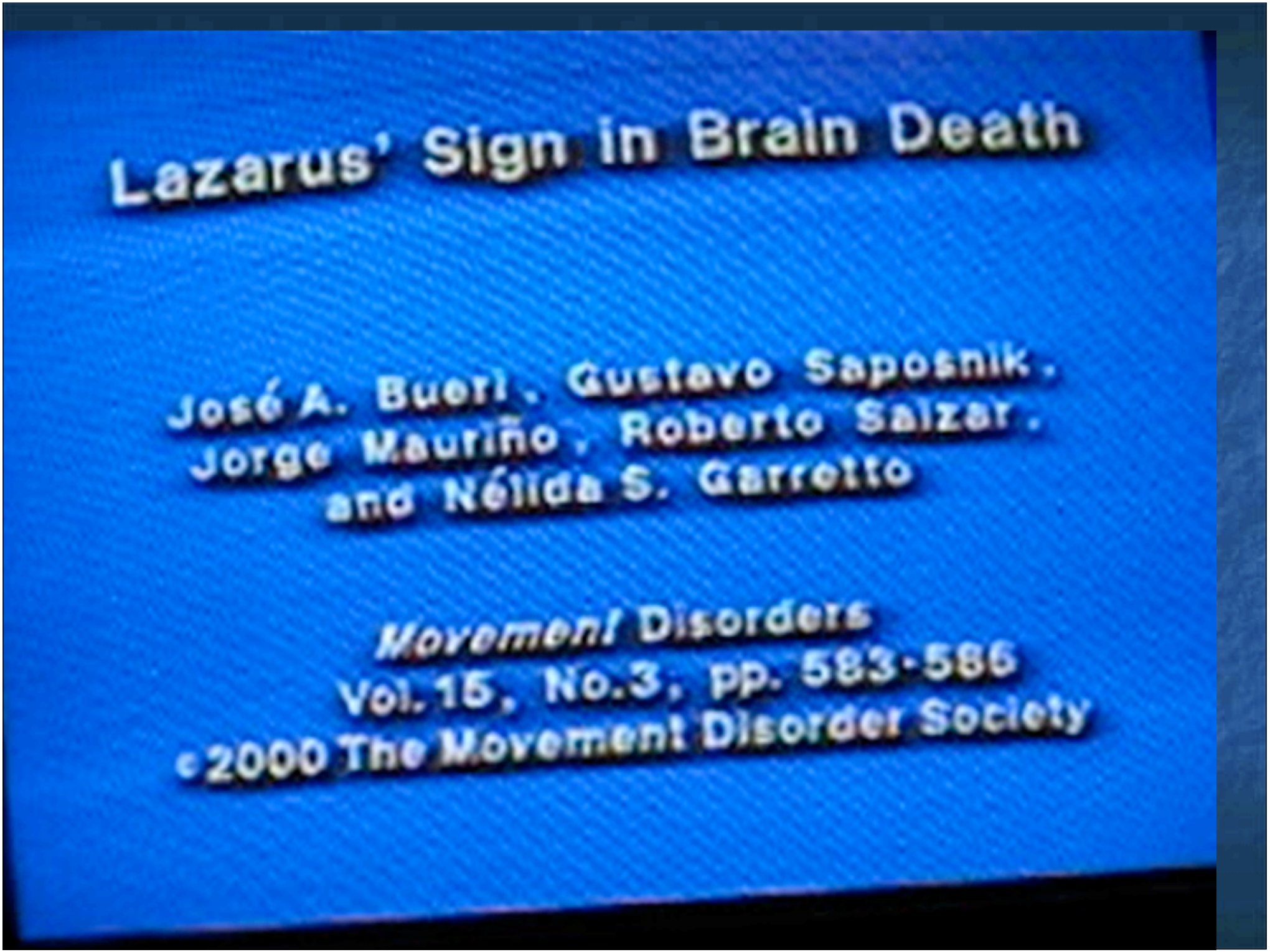
Monosegmental muscle stretch reflexes (MSR)
(Ivan, 1973; Mohandas and Chou, 1971; Robert and Mumenthaler, 1977)
Oligosegmental cutaneo-muscular reflexes cremaster R., plantar extensor response, etc.
Tonic penile erections/vaginal contractions, tonic plantar flexion, Galant R. (Schneider *et al.*, 1969; Gerstenbrand, 1973)
Polysegmental spinal reflex patterns (PSRP)
Embrace (Moro-) response (Allen *et al.*, 1980),
NeckFlexion–AbdominalContraction–, NeckFlexion–HipFlexion–, NeckFlexion–ArmFlexion–Reflex (Schneider *et al.*, 1969; Ivan, 1973)
EndotrachealSuction–ArmFlexion–Reflex, LegStrike–LegFlexion–Reflex (Jordan *et al.*, 1985; Schneider *et al.*, 1969),
Undulating toe flexion sign (McNair and Meador, 1992)
Head tilt upon noxious stimuli on upper limb (Patterson and McShane, 1991)
Polysegmental spinal automatism patterns (PSAP)
Embrace automatism/Moro automatism without hypoxia (Mandel *et al.*, 1982; Aranibar, 1991)
Lazarus sign
Moro automatism (in terminal spinal hypoxia)
(Heytens *et al.*, 1989; Jastremski *et al.*, 1991 [2nd case]; Jørgensen, 1973; Ropper, 1984; Jordan *et al.*, 1985;
Urasaki *et al.*, 1992; Wagner and Urasaki, 1992; van den Bent et al. 1993)

Polysegmentale spinale reflexen

Nek flexie ➡ bovenarm adductie, elleboogflexie en buikspier samentrekking

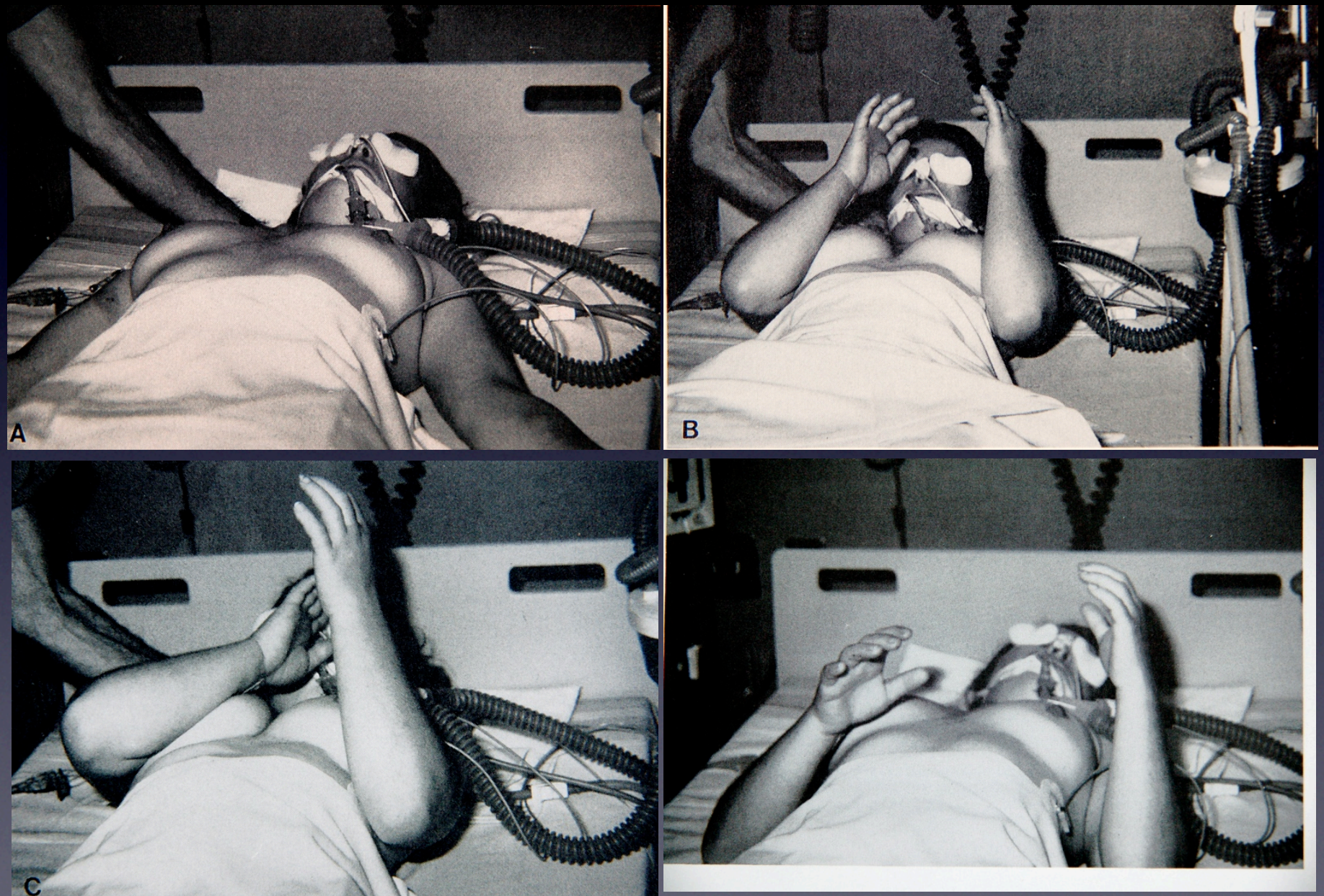
Polysegmentale spinale reflexen

nek flexie- abnormale elleboog flexie en extensie en buikspiercontractie


Lazarus' Sign in Brain Death
José A. Bueri, Gustavo Saposnik,
Jorge Maurino, Roberto Salzar,
and Nélida S. Garretto
Movement Disorders
Vol. 15, No. 3, pp. 583-586
©2000 The Movement Disorder Society

Polysegmentale spinale reflexen

nekflexie ➡ 'Moro-like' elleboogflexie en bewegingen van de vingers


A
B
C

Lazarus sign

Geen stimulus ➡
polysegmentale spinale automatisme en Moro-like automatisme

Lazarus sign and extensor posturing in a brain-dead patient

Case report

LUC HEYTENS, M.D., JAN VERLOOY, M.D., JAN GHEUENS, M.D., AND LEO BOSSAERT, M.D.

Departments of Intensive Care, Neurosurgery, and Neurology, University Hospital Antwerp, Edegem, Belgium

✓ A man was declared brain dead after having sustained a gunshot wound to the head. All clinical criteria for the diagnosis of brain death were met. The electroencephalogram was isoelectric, and four-vessel angiography demonstrated the absence of cerebral blood flow. However, stereotypic spontaneous movements were observed which persisted for several hours. The possible mechanism is discussed and a short review of the literature is given.

J. Neurosurg. / Volume 71 / September, 1989

While final contact was being made with the relatives, spontaneous movements were seen. The attending nurse said the patient appeared to grasp for his endotracheal tube. Complete neurological examination was

Complexe polysegmentale spinale reflexen na pijnprikkel.

Bilaterale flexie van de armen. adductie en heffing armen

Casuïstische mededelingen

Onverwachte bewegingen bij een hersendode patiënt

M.J.VAN DEN BENT, M.RONDAY EN A.OOSTERLEE

Ned Tijdschr Geneeskd 1993; 137, nr 51

deze landen werden ingeschakeld voor de orgaanuitname. De daaropvolgende dag werd vlak voor patiënte naar de operatiekamers zou worden getransporteerd de reactie op pijnprikkels opnieuw gecontroleerd door druk op het nagelbed. Hierop volgden beiderzijds strekreacties van de armen, gecombineerd met enige adductie en heffing van de armen in de schouders. Herhaling van het overige neurologische onderzoek liet onveranderd afwezige hersenstamreflexen zien.

Consequenties

Casuïstische mededelingen

Onverwachte bewegingen bij een hersendode patiënt

M.J.VAN DEN BENT, M.RONDAY EN A.OOSTERLEE

Op grond van de waargenomen bewegingen werd de diagnose 'hersendood' in twijfel getrokken en de transplantatieteams – die deels al onderweg waren – werden afbesteld. Opnieuw werd er een apnoe-test uitgevoerd, waarbij bij een Pco_2 van 9,3 kPa geen ademhaling werd gezien (uitgangswaarde: 6,0 kPa). Nadat de genoemde bewegingen waren geduid als spinale reflexen werd met een vertraging van vele uren de donorprocedure alsnog uitgevoerd. Door de valse start eerder die dag

ELSEVIER

Frequency of Spinal Reflex Movements in Brain-Dead Patients

L. Döşemeci, M. Cengiz, M. Yılmaz, and A. Ramazanoğlu

Transplantation Proceedings, 36, 17–19 (2004)

The occurrence of spinal reflexes in brain-dead patients may certainly delay decision making, such as starting a transplantation procedure, because of difficulties in convincing the family or even a physician taking part in the diagnosis of brain death. An awareness of spinal reflexes may prevent delays in and misinterpretations of the brain-death diagnosis.

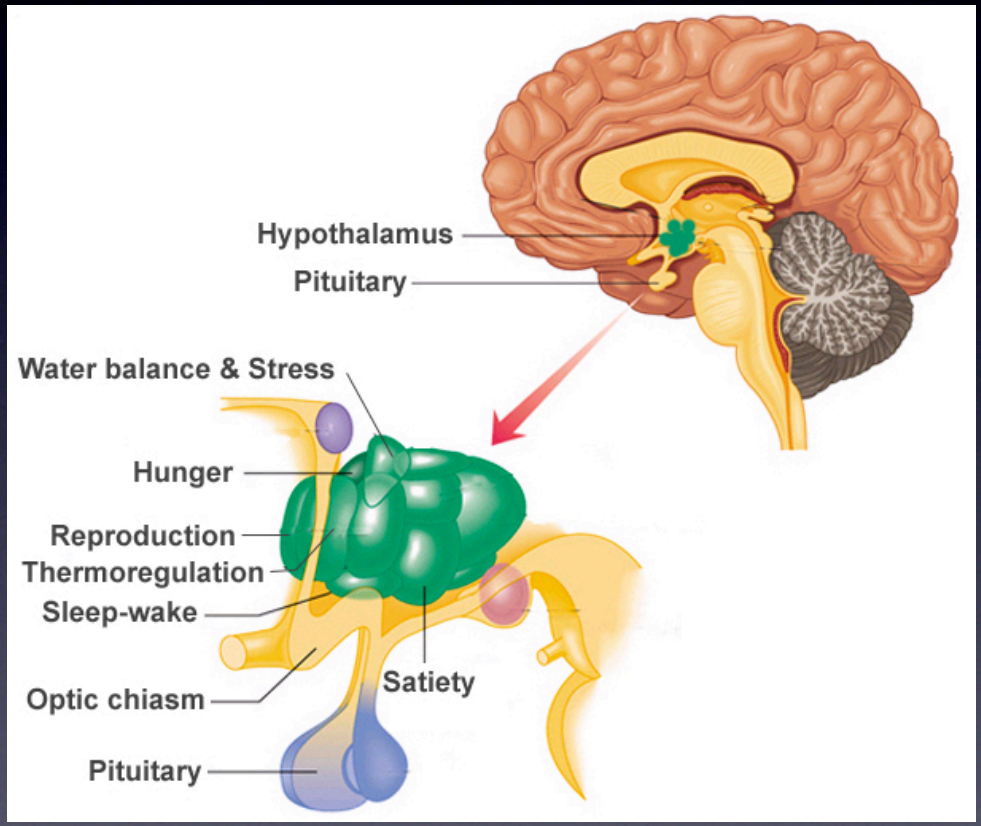
Conclusie 1

PSSR en Lazarus automatisme zijn rationeel verenigbaar met ‘dood’

Intiutief en emotioneel ligt dit veel problematischer (zowel bij de leek als de professional)

2

‘Doden met intacte homeostase’



HYPOTHALAMIC-PITUITARY FUNCTION IN THE "BRAIN-DEAD" PATIENT

SIR,—The controversy over the lack of objective tests to support the clinical diagnosis of brain death encouraged us to examine changes in hypothalamic-pituitary function in five brain-dead patients who satisfied the criteria of the medical Royal Colleges.[1] After the brain death had been first diagnosed, blood samples were collected every 4 h for the next 24 h for the estimation of circulating TSH, prolactin, and cortisol concentrations. During the 24 h period of study care was taken to ensure that there were no disturbances of body temperature, acid-base balance, and blood glucose, and that normal arterial blood pressure was maintained without pharmacological support. At the end of the 24 h the neurological tests were repeated and, since they confirmed brainstem death, artificial ventilation was discontinued.

The initial mean ±SD plasma TSH, prolactin, and cortisol concentrations of 2·6 ±1·2 mU/l, 9·9±3·8 mU/l, and 308 ±181 nmol/l, respectively, were within the normal range. There was no significant change during the subsequent 24 h, although the usual diurnal cortisol variation was absent. Thus hypothalamic-pituitary function is maintained for at least 24 h after the diagnosis of brainstem death and hormonal evaluation of such patients is of no value in confirming the diagnosis.

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G. M. HALL
K. MASHITER
JEAN LUMLEY
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Neurol Med Chir (Tokyo) 31, 881～886, 1991

脳死患者における視床下部下垂体機能

横田　裕行・中沢　省三・志村　俊郎・木村　昭男*・山本　保博*・大塚　敏文*

Hypothalamic and Pituitary Function in Brain Death

Hiroyuki YOKOTA, Shouzo NAKAZAWA, Toshirou SHIMURA, Akio KIMURA*, Yasuhiro YAMAMOTO* and Toshibumi OTSUKA*

*Departments of Neurosurgery and *Emergency and Critical Care Medicine, Nippon Medical School, Tokyo*

ophthalmic artery in three patients who showed non-filling on angiography. Postmortem microscopic examination of the hypothalamus and anterior pituitary lobe revealed normal structure and cells intermingled with lytic changes and necrosis. This series suggests that some part of the hypothalamus and hypophysis may still be alive after brain death, although the function of these regions may be clinically insignificant.

Arita K et al.
No Shinki Geka 1988; 16: 1163-1171

13 hersendode patienten

ADH, TSH, GH, GRF, CRF normaal

In sommige gevallen 9-15 dagen na vaststelling hersendood

Am Surg. 2006 May;72(5):377-81.

Complications of brain death: frequency and impact on organ retrieval.

Salim A, Martin M, Brown C, Belzberg H, Rhee P, Demetriades D.

Department of Surgery, Division of Trauma and Critical Care, University of Southern California Keck School of Medicine, Los Angeles, USA.

96 hersendode orgaandonoren

Diabetes insipidus in 46,4%

Diabetes insipidus na vaststelling hersendood

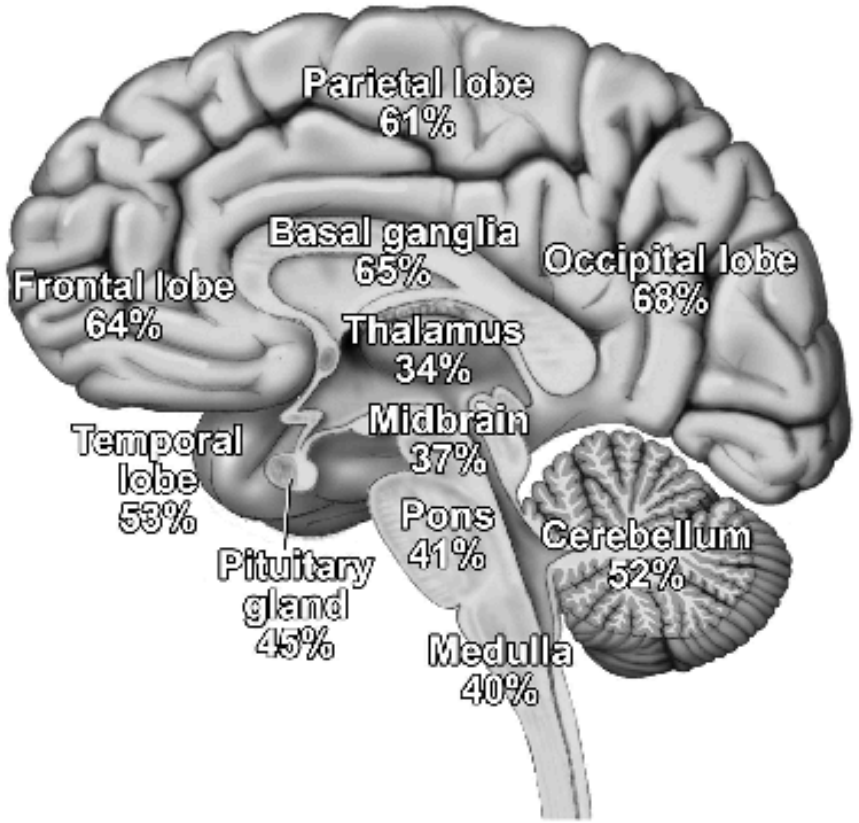
- Schneider et al. (1969): 70%
- Ibe (1971: 100%
- Jogensen (1973): 37%
- Arfel (1976): c. 50%
- Robert & Mumenthaler (1977): 27%
- Jastremski et al. (1978): 9%
- Pendl (1986): 30-50%
- Fiser et al. (1987): 38%
- Keogh et al.: 77%
- Howlett etal. (1989): 77%
- Teja et al. (1991): 81%
- Gramm et al. (1992) 78%
- Stocker & Rohling (1996): 38-78%
- De Jong et al. (1998): 90%

Neuropathology of brain death in the modern transplant era

Eelco F.M. Wijdicks, MD, PhD
Eric A. Pfeifer, MD

Neurology® 2008;70:1234-1237

Figure 2 Percentage of moderate to severe neuronal ischemic changes in 41 autopsies of patients who fulfilled the clinical criteria of brain death



Brazilian Journal of Medical and Biological Research (1999) 32: 1479-1487
ISSN 0100-879X

Implications of ischemic penumbra for the diagnosis of brain death

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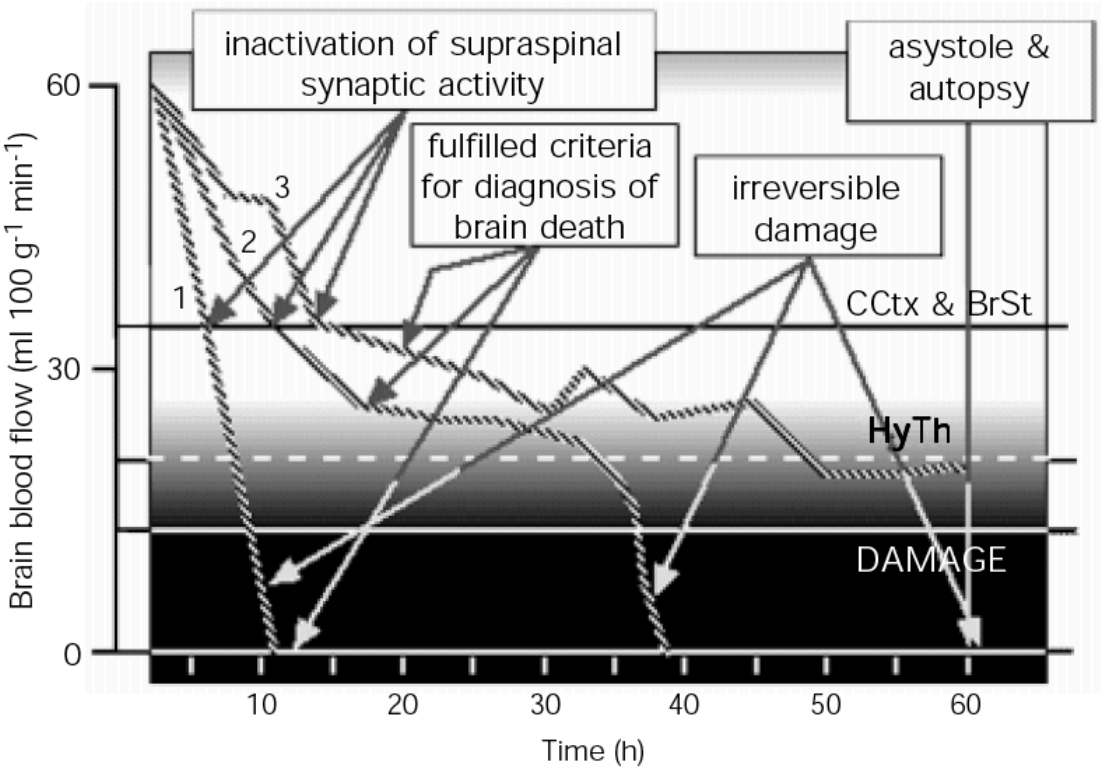

Figure 1 - Evolution of brain blood flow (BBF) in three hypothetical cases of increased intracranial pressure (ICP) with absent supraspinal synaptic activity (coma and absent cephalic reflexes) for at least 48 h prior to cardiac arrest at 60 h-survival. While in case 1 brain damage becomes irreversible within 6 h from the onset of the "brain death" syndrome, in case 2 irreversibility is only achieved within 24 h, and in case 3 the brain tissue is still recoverable by the time of cardiac arrest which may result from metabolic disorders related to hypothalamic failure. If case 1 was representative of all (or at least most) cases of increased ICP at risk of brain death, full maturation of pathological features would develop during the next 48 h of continuous heart beating, and nearly 100% of autopsies (if not all of them) should demonstrate the respirator brain. In contrast, since respirator brain is only seen in 40% of these cases (21), global ischemic penumbra of variable duration is to be alternatively considered. CCtx & BrSt = BBF threshold below which cerebral cortex and brain stem functions become inactive (35 ml 100 g^{-1} min^{-1}); DAMAGE = BBF threshold below which cells depolarize (10-15 ml 100 g^{-1} min^{-1}). HyTh = BBF threshold below which hypothalamic secretory functions become inactive (CCtx & BrSt > HyTh > DAMAGE).

Gezondheidsraad, *Hersendoodcriteria*, 1996

'Ontbreekt het symptoom (diabetes insipidus), dan zijn kennelijk nog enige overlevende cellen in de hypothalamus in staat het hormoon in voldoende mate te produceren, hetgeen minder zwaar hoeft te wegen bij de vaststelling van hersendood dan de uitval van hogere hersenfuncties'

D. Swaab, *Brain death and 'dead' neurons*

in *Handbook of Clinical Neurology*,

Volume 80, 2004

'The present monography will also have made clear that the hypothalamus is involved in many 'higher' functions, so that it will be difficult to use 'the higher brain criterion of brain death' if remnants of the hypothalamus are still functioning'

Centrale temperatuur regulatie

PSYCHOSOMATIC MEDICINE—VOL. I, NO. 4, OCTOBER, 1939

THE HYPOTHALAMUS AS A THERMOSTAT REGULATING BODY TEMPERATURE*

S. W. RANSON, M.D.

Poikilothermia

No patient had spontaneous diurnal changes in body temperature. The rectal temperature varied with the environmental temperature (poikilothermia) in 45 patients; in 11 patient ventilated with non-heated, humidified air, the rectal temperature dropped towards the room temperature (Fig. 1) whereas 34 patients who respired warm, humidified air showed fluctuations in rectal temperature which followed the changes in temperature of the respirator air (Fig. 2).

In 15 patients, the rectal temperature was 37–40 °C independent of changes in the temperatures of the room and respirator air. These patients had final asystole within 24 hours after brain death; the factors that might be responsible for the preservation of normal or increased body temperature for a limited period of time are discussed later.

The remaining 3 patients were cooled artificially and could not be evaluated.

Conclusie 2

Persisterende hypothalamusfunctie is feitelijk niet te rijmen met het concept van ‘whole-brain death’

Vooralsnog wordt het geaccepteerd als ‘minder relevant’ (primitieve hersenfunctie)

Nieuwere inzichten geven meer twijfel over de juistheid van 2e redenatie (Swaab)

Controversies in the Determination of Death

A White Paper by
the President's Council on Bioethics

December 2008

3

Zwangere lijken

Neurol Med Chir (Tokyo) 48, 114～117, 2008

Prolonged Somatic Survival of Clinically Brain-Dead Adult Patient

—Case Report—

Jun MARUYA, Keiichi NISHIMAKI, Jun-ichi NAKAHATA*, Hiroko SUZUKI*, Yasuo FUJITA*, and Takashi MINAKAWA

*Department of Neurosurgery and *Emergency and Critical Care Center, Akita Red Cross Hospital, Akita*

Here we describe the case of an adult woman who survived for 165 days after the diagnosis of clinical brain death, which illustrates the complexity of medical and social problems in Japan associated with prolonged somatic support for patients after brain death.

9-12-92

Klinisch dode vrouw in leven om baby te redden

GIJON, 9 DEC. Een klinisch dode zwangere vrouw in de Noord-Spaanse stad Gijon wordt al drie weken in leven gehouden in een poging van artsen om haar baby te redden. Dat hebben Spaanse media gisteren gemeld.

Een team artsen van het Cabuenes ziekenhuis in Gijón hoopt dat zij de foetus nog zeven weken in leven kunnen houden. De vrucht zal dan 33 weken oud zijn en buiten de baarmoeder in leven kunnen blijven, zo verwachten de artsen.

De krant *El Mundo* schreef dat de dertigjarige vrouw wordt beademd en dat haar hartslag door middel van medicijnen op gang wordt gehouden. Het is niet bekend waardoor de vrouw is overleden. De familie van de vrouw heeft verzocht om haar identiteit geheim te houden. Volgens krantenberichten zou het laatste verzoek van de vrouw aan de artsen zijn geweest alles in het werk te stellen om het kind te redden.

In 1992 zorgde een soortgelijk geval in de Duitse stad Erlangen voor een controverse. De zogenoemde „baby van Erlangen" werd door artsen zes weken in leven gehouden in de buik van de klinisch dode 18-jarige tandartsassistente Marion Ploch, die het slachtoffer was van een auto-ongeluk. De vier-eneenhalve maand oude foetus overleed na een „spontane abortus".

De ethische commissie van het ziekenhuis en de behandelende artsen oordeelden destijds dat de moeder als een soort biologische couveuse „in leven" moest worden gehouden omdat zij vonden dat het kind recht op leven had.

Deskundigen vreesden dat de kick van het medisch experiment bij de artsen voorop stond en niet het belang van het kind. (AP)

AD 1/4 1993

Baby voor hersendode moeder

SAN FRANCISCO (AP) — In een ziekenhuis te San Francisco is een gezonde baby geboren uit een vrouw die al twee maanden geleden hersendood was verklaard.

De vrouw kreeg in januari, toen zij 5½ maand zwanger was, een hartaanval die tot haar dood leidde. In overleg met de familie werd zij terwille van de vrucht kunstmatig met een hart-longmachine in leven gehouden totdat het jongetje met de keizersnede op de wereld kon worden gebracht.

Direct daarna werd de hart-longmachine gestopt, waardoor de ademhaling van de eigenlijk al twee maanden eerder overleden vrouw ook stilviel.

Foetus zwangere dode in Duitsland sterft na 5 weken

BERLIJN (AP) – Een 18-jarige hersendode Duitse vrouw die kunstmatig in leven werd gehouden om haar zwangerschap te kunnen voltooien, is gisteren vroegtijdig bevallen van een dode baby. De artsen zetten na de miskraam de machines uit die de vrouw nog in leven hielden.
De vrouw liep op 5 oktober ernstig hersenletsel op bij een auto-ongeluk. Haar ouders hadden toestemming gegeven om de baby te laten groeien, wat in Duitsland tot een heftige discussie leidde. De ouders zeiden dat het moord zou zijn om de baby geen kans te gunnen, tegenstanders spraken van een 'broedmachine' zonder menselijke waardigheid.

TROUW
17/XI/1992

THE TIMES
THE SUNDAY TIMES

From The Sunday Times

January 29, 2006

Second brain dead mother 'kept alive'

Jan Battles

Reproductive Health

BioMed Central

Case report

Open Access

The prolongation of somatic support in a pregnant woman with brain-death: a case report

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RESEARCH ARTICLE Open Access

One life ends, another begins: Management of a brain-dead pregnant mother-A systematic review-

Majid Esmaeilzadeh[1], Christine Dictus[2], Elham Kayvanpour[2], Farbod Sedaghat-Hamedani[1], Michael Eichbaum[3], Stefan Hofer[4], Guido Engelmann[5], Hamidreza Fonouni[1], Mohammad Golriz[1], Jan Schmidt[1], Andreas Unterberg[2], Arianeb Mehrabi[1†], Rezvan Ahmadi[2*†]

n = 30 goed gedocumenteerde gevallen

Doorbehandeling op IC 2-107 dagen (m=38 dagen)

Weken zwanger 13-30 weken bij vaststelling HD

CS bij 26-33 weken

In 3 gevallen zowel CS als PMOD (1-year graft survival 'excellent')

1989: Conley Hilliker (107 dagen doorbehandeling na vaststelling van de hersendood)

MATERNAL BRAIN DEATH AND PROLONGED FETAL SURVIVAL

I. M. Bernstein, MD, M. Watson, MD, G. M. Simmons, MD, P. M. Catalano, MD, G. Davis, MD, and R. Collins, MD

A 30-year-old woman suffered massive brain injuries after a motor vehicle accident at 15 weeks' gestation. The patient was diagnosed as brain-dead on her tenth hospital day. She was supported with intensive care for 107 days after this diagnosis, and a normal 1555-g male infant was delivered at approximately 32 weeks' gestation by repeat cesarean section. The child is developing normally at 11 months of age. This represents the longest reported case of prolongation of pregnancy after brain death. ***(Obstet Gynecol 74:434, 1989)***

Successful prolongation of gestation in women who have sustained massive brain injury or brain death is within the capability of current medical practice. The physiologic limits of this prolongation are unclear. In this report, we describe the case of a woman who maintained continued systemic integrative physiologic function, with growth and development of a fetus for 107 days despite the identification and diagnosis of maternal brain death.

Case Report

A 30-year-old woman, gravida 3, para 2–0–0–2, with an unknown last menstrual period, suffered massive closed-head injury as a result of a motor vehicle accident. In the emergency department of the referring hospital, she was noted to have decerebrate posturing, spontaneous respirations, and responses only to noxious stimuli. The patient was intubated, hyperventilated, and treated with intravenous (IV) dexamethasone to reduce brain edema. Computed tomographic (CT) scanning of the patient's head revealed diffuse intracerebral hemorrhage including the midbrain and brain stem. She was considered not to be an operative candidate. The patient's pregnancy was initially dated clinically by a uterus of 12–14 weeks' size. Serial sonography later dated the pregnancy to 15 weeks' gestation at the time of admission.

The early hospital course was remarkable for the continuation of intermittent respiratory effort while intubated and the development of an *Hemophilus influenzae* pneumonia treated with IV cefuroxime. On the seventh hospital day, the patient experienced an episode of hypertension, supraventricular tachycardia, and ventricular tachycardia, which responded to appropriate therapy. After this episode, her neurologic functioning deteriorated. She showed no further spontaneous respirations, her pupils were fixed in mid-position, she lost her decerebrate posturing, and no reflexive responses or responses to painful stimuli could be elicited. An electroencephalogram performed on the tenth hospital day showed electrocerebral silence, and the patient was declared dead by brain criteria. Electroencephalography was performed at 2 μV/mm for more than 30 minutes. Interelectrode distance was greater than 10 cm. The maternal temperature was 35.9C. The electroencephalogram was isoelectric in all leads. Auditory and visual evoked responses were absent. Discussions were then held with the family regarding maternal status and the potential for fetal survival. The physicians offered the possibility of providing continued maternal somatic support in an attempt to prolong gestation to fetal viability. After extensive discussions, the patient's family decided that attempts should be made to prolong gestation.

During her early hospital course, the patient developed complete pituitary failure. Diabetes insipidus developed on hospital day 11, and was followed by requirements for physiologic replacement of thyroid hormone and corticosteroids, in addition to synthetic vasopressin. At the same time, the patient developed thermovariability, with wide fluctuations in rectal temperatures (35–38.9C). These temperature variations required both cooling and heating blankets for control.

Throughout her course, the patient was supported with assisted mechanical ventilation. A tracheostomy was performed on the fourth hospital day. Complications of ventilatory therapy included persistent lower-lobe consolidation identified by chest x-ray. This could not be described definitively as pneumonia or as basilar atelectasis. Endotracheal cultures were sequentially positive for *Hemophilus*, *Acinetobacter*, and *Pseudomonas* species, each of which responded to appropriate antibiotics.

A persistent anemia required occasional transfusion and remained unexplained. There was no evidence of blood loss. Tests for hemolysis were negative, and the patient had normal nutritional parameters with a low reticulocyte count. Bone marrow evaluation was not performed.

Cardiovascular instability was manifest as maternal bradycardia on hospital days 50 and 94. These events were transient; the initial episode lasted 60–90 seconds, showed no response to atropine, and resolved spontaneously. The second episode lasted 2–3 minutes and was associated with fetal bradycardia. Chest compressions had begun at the time that the maternal and fetal heart rates returned to normal.

The patient was transferred to a University hospital at 25 weeks' gestation, where intensive neonatal support could be provided if necessary. The patient was managed jointly by the pulmonary and obstetric services. Immediately after transfer, a nuclide angiogram was performed which showed no intracerebral blood flow. Subcutaneous heparin (5000 U twice a day) was initiated to reduce the risk of deep vein thrombosis.

Fetal surveillance consisted of external monitoring of uterine activity and fetal heart rate recording every 8 hours for 30 minutes. Biophysical profile scoring was performed three

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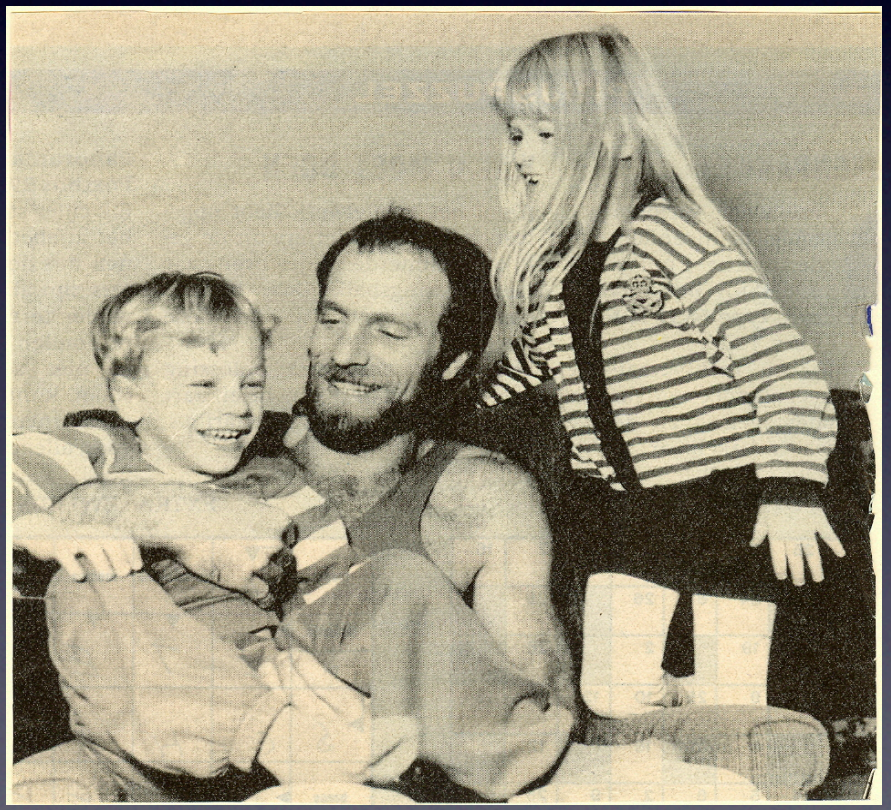

1989, Nicola Bell (60 dagen doorbehandeling na vaststelling van de hersendood)

Foto's: Capital Press/RBP

Gaby Siegel, juli 1991 (85 dagen doorbehandeling na vaststelling van de hersendood)

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Case report

Prolongation of pregnancy in a woman who sustained brain death at 26 weeks of gestation

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Three days after her admission she had regular uterine contractions. The cervix was partially effaced but not dilated.

From the tenth day after her admission, progressive oligohydramnios was noted, which prompted delivery by classical caesarean section on the 14th day at 28 weeks of gestation.

Marion Ploch, Erlangen, 1992

Intensivmedizinische Maßnahmen an hirntoten Schwangeren in Recht und Ethik

M. H. Stellpflug

Sachlicher Ausgangspunkt für die Betrachtungen intensivmedizinischer Maßnahmen an hirntoten Schwangeren sei der seinerzeit Aufsehen erregende Fall der Marion P., die am 5. Oktober 1992 nach einem schweren Verkehrsunfall in das Universitätsklinikum Erlangen eingeliefert wurde. Dort wurde am 8. Oktober 1992 der Gehirntod festgestellt. Aufgrund der Schwangerschaft (13. – 15. Woche) der volljährigen Patientin wurden danach Kreislauf und Atmung intensivmedizinisch aufrechterhalten, um das ungeborene Kind der Frau zu retten (2, 4).

Diese Maßnahmen wurden in den Medien und der Öffentlichkeit ausgesprochen kontrovers diskutiert. Polemische Schlagworte wie »Perversion von Menschlichkeit« »Degradierung der Mutter zur Nährlösung« oder »Menschenversuch« machten die Runde (1). Aber auch in der juristischen Fachliteratur, wenngleich verbal deutlich moderater, finden sich beträchtliche Differenzen in der rechtlichen Bewertung der geschilderten Situation. Dabei stellen sich in rechtlicher Hinsicht zwei Fragen, wenn einmal die neuerlich wieder intensiv geführte Diskussion um den Todesbegriff ausgeklammert werden soll: Ist die Behandlungsfortsetzung in den hier diskutierten Fällen *zulässig* oder ist sie möglicherweise sogar *geboten*?

Zulässigkeit der Behandlungsfortsetzung

Unzulässig könnte die Behandlungsfortsetzung sein, wenn ein gesetzliches Ge- bzw. Verbot ihr entgegenstünde.

Dabei kommen Straftatbestände in Betracht, die zum Schutz der hirntoten Schwangeren vor den fraglichen intensivmedizinischen Handlungen bestimmt und geeignet sind. Um das Ergebnis vorwegzunehmen: Der menschliche Leichnam, und so auch die hirntote Schwangere, ist durch das deutsche Strafrecht nicht gegen Handlungen der hier diskutierten Art geschützt (7).

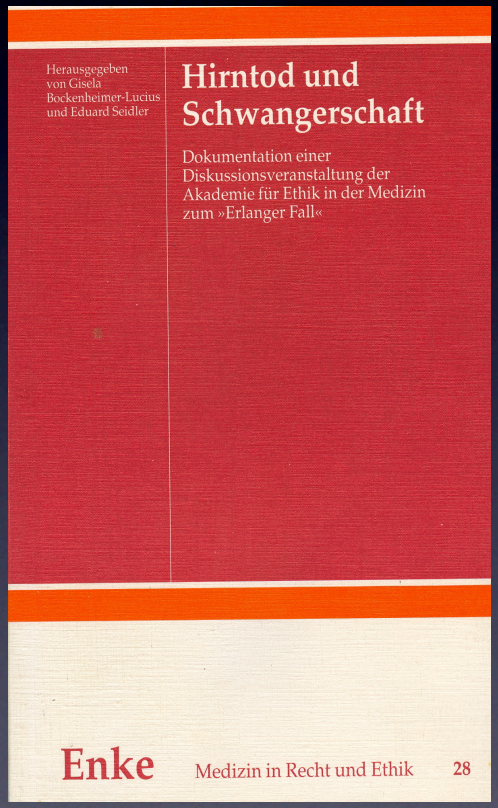
Körperverletzungsdelikte (§§ 223 ff. Strafgesetzbuch [StGB]) sind nicht anwendbar, da sie nur den lebenden Menschen schützen. Auch *Eigentumsdelikte* (§§ 242, 246, 303 StGB) sind tatbestandlich auszuschließen. Dabei gehen die Auffassungen in der Rechtsliteratur und Rechtsprechung schon bezüglich der Frage, ob der menschliche Leichnam eine »Sache« im Sinne des Strafrechts darstelle, völlig auseinander. Hier divergieren selbst die Einschätzungen darüber, welches dazu die herrschende Meinung sei, im gleichen Maße wie die jeweiligen Theorien. Recht einheitlich, wenn auch mit unterschiedlicher Begründung, wird aber jedenfalls die »Fremdheit« des Leichnams abgelehnt. Dabei wird insbesondere darauf verwiesen, daß der Leichnam nicht aneignungsfähig sei, in niemandes Eigentum stehen und damit auch nicht »fremd« sein könne. Damit kommt der Leichnam als Tatobjekt der Eigentumsdelikte nicht in Betracht.

Auf den Schutz des Leichnams zugeschnitten erscheint § 168 StGB (Störung der Totenruhe). Hier aber scheitert eine Anwendbarkeit an dem tatbestandlichen Erfordernis der »Wegnahme aus dem Gewahrsam des Berechtigten«. Gewahrsam wird (hier) verstanden als »Obhut über die Leiche«. Nach dem Ableben der Marion P., um auf den Ausgangsfall zurückzukommen, änderte sich aber erkennbar nichts an den tatsächlichen Obhutsverhältnissen des Leichnams. Eine Wegnahme (Bruch des Obhutsverhältnisses) liegt daher regelmäßig nicht vor.

Schließlich fehlt es bei § 189 StGB (Verunglimpfung des Andenkens Verstorbener) am geforderten Ausdruck der Mißachtung gegenüber der Toten, bei § 118 des Gesetzes über Ordnungswidrigkeiten (OWiG) (Belästigung der Allgemeinheit) mangelt es an der Unmittelbarkeit zwischen Tathandlung und Taterfolg.

Auch wenn die Untersuchung der Strafbarkeit von intensivmedizinischen Maßnahmen an hirntoten Schwangeren im einzelnen noch ausgesprochen interessante rechtliche und ethische Fragen aufwirft, so soll doch diese kurze Betrachtung genügen. Ganz überwiegend wird nämlich im Ergebnis die Strafbarkeit einer Behandlungsfortsetzung in den hier diskutierten Fällen verneint und von der strafrechtlichen Zulässigkeit der fraglichen Maßnahmen ausgegangen (1, 5, 6). Uneinigkeit dagegen besteht in Hinsicht auf die zweite Frage, ob eine Behandlungsfortsetzung vielleicht rechtlich sogar geboten ist.

Dtsch. med. Wschr. 122 (1997), 594 – 596



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Seventy-eight percent of brain-dead patients who were kept alive for more than a few days developed central diabetes insipidus (DI) resulting from posterior pituitary gland failure [19]. Administration of vasopressin and

[38,39]. To prevent preterm uterine contractions, in particular in the early weeks of gestation when no fetal lung maturation is yet provided, tocolytic interventions may be needed. Calcium channel blockers and prostaglandin

Conclusie 3

Een zwangere HD vrouw wordt niet als ‘dood’ gezien en behandeld

Dat zwangere HD vrouwen uteriene contracties krijgen en de foetus intrauterien ‘rijpt’ kan intiutief en gevoelsmatig als ‘leven’ worden gezien


"That's all Folks!"