



WARSZAWSKI  
UNIwersYTET  
MEDYCZNY

# ORGAN DONOR

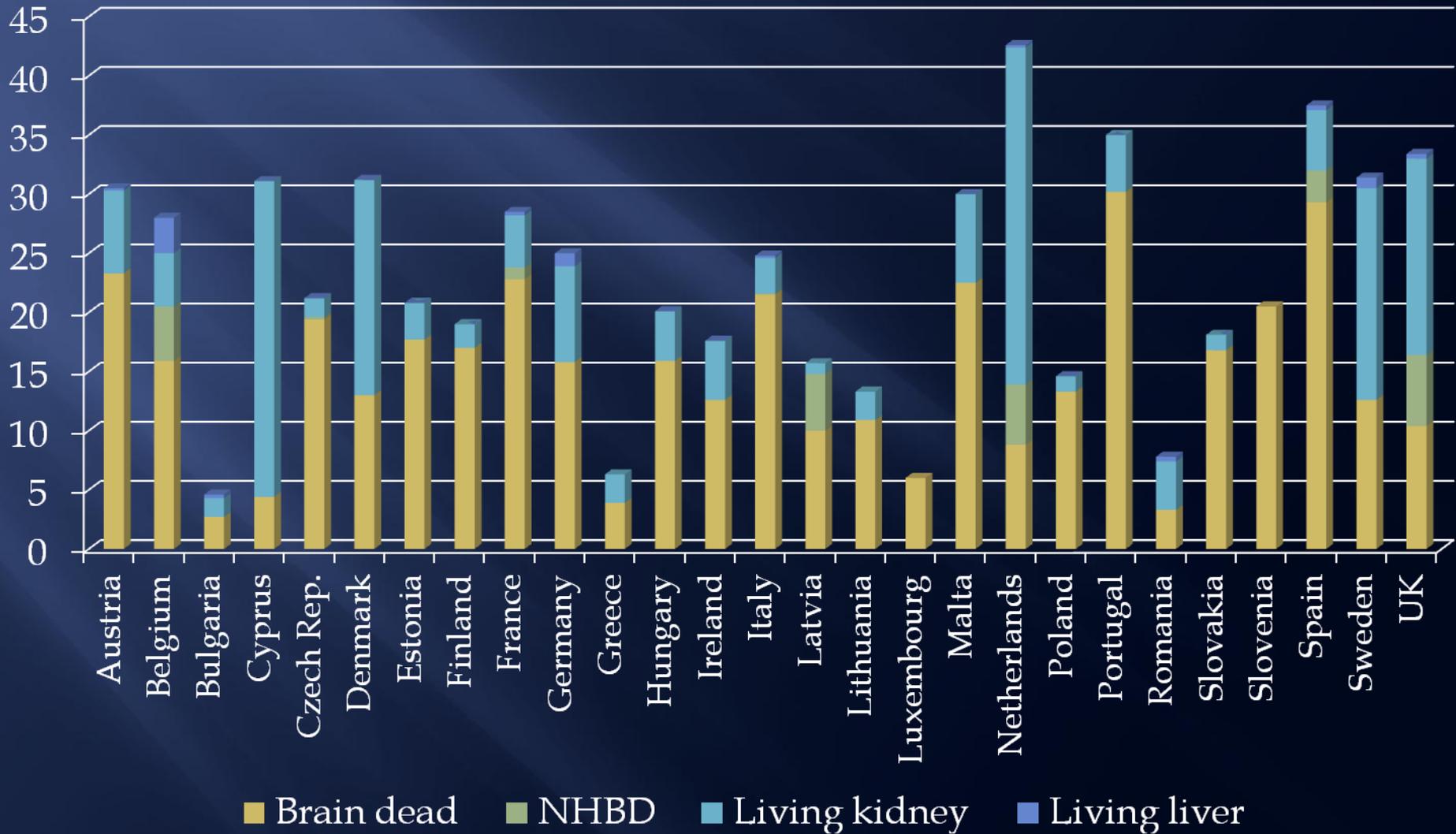
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# Organ donors

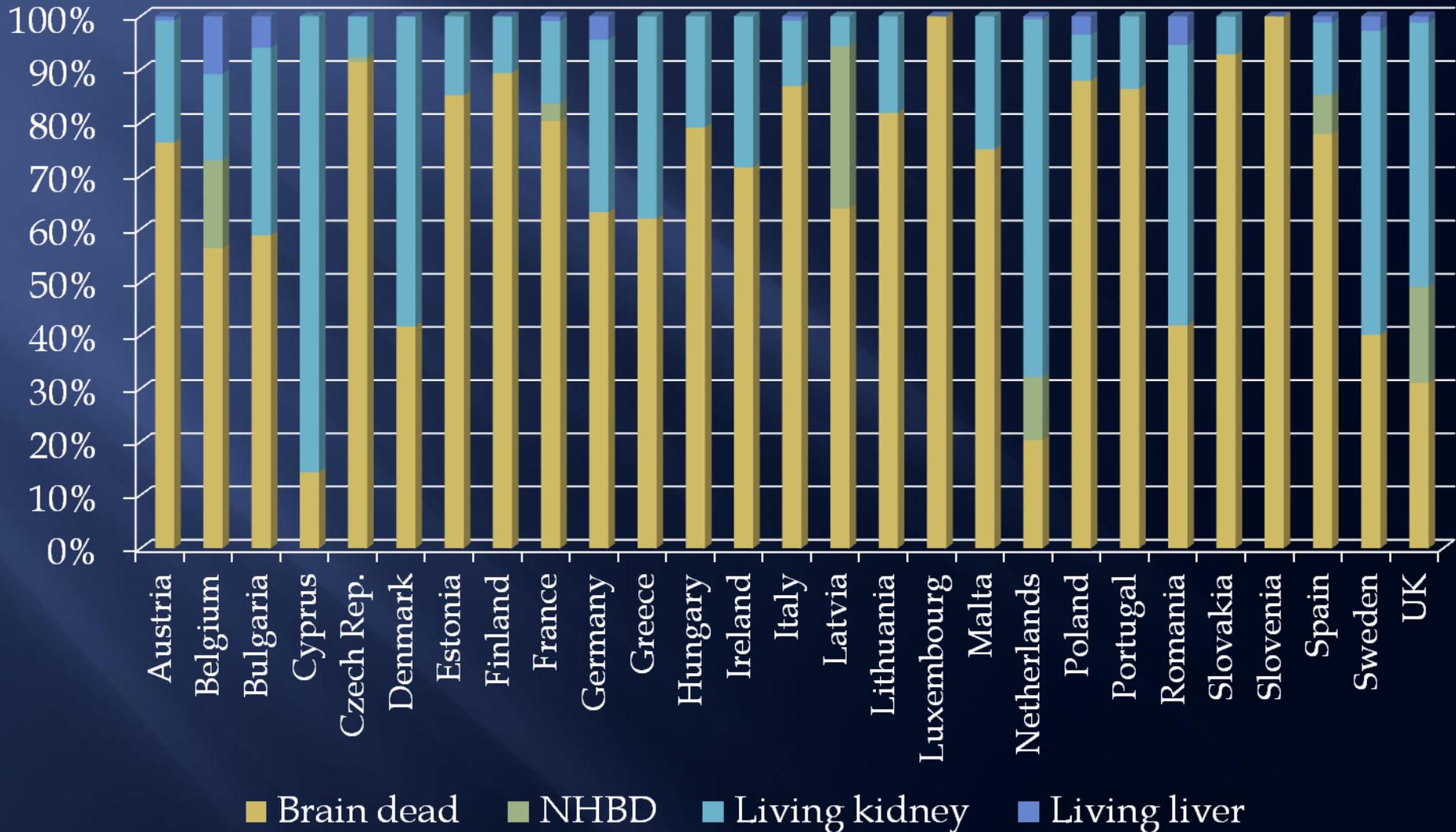
- ▣ Living donors
  
- ▣ Deceased donors
  - Donors with neurological definition of death (brain-dead donors -BDD)
  - Donors with circulatory definition of death (non-heart beating donors - NHBD)
  
- ▣ Regenerative medicine  
<http://www.wakehealth.edu/WFIRM/>
  
- ▣ Xenografts

# Organ donors in EU countries

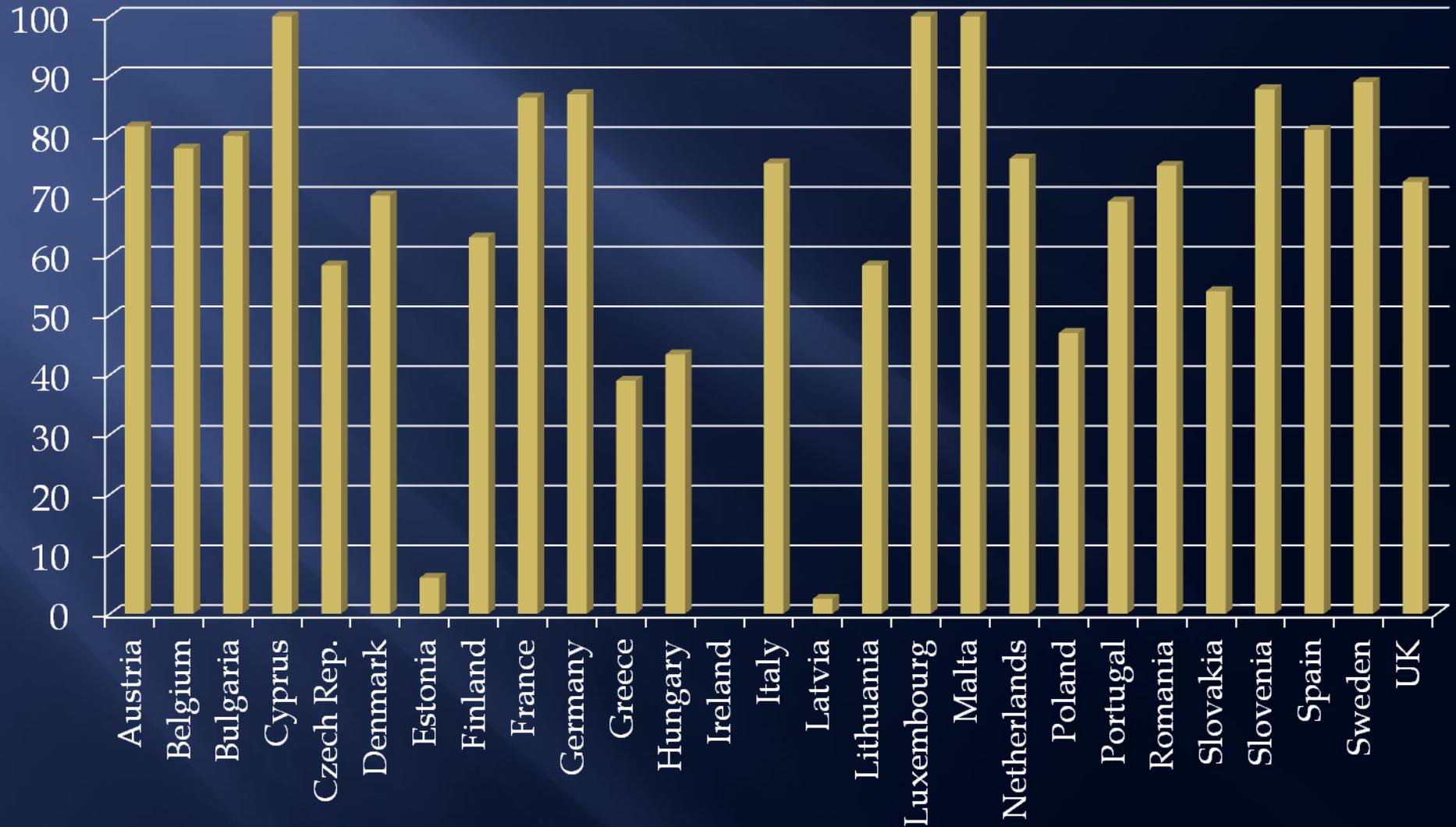
## pmp



# Organ donor type in EU countries



# Percentage of multiorgan retrievals



# Living donor

- ▣ Related donors
- ▣ Non-related donors
  - Family
  - Partners
  - Friends
  - Domino donors
  - Altruistic donors
  
- Organ trafficking
  - eBay auction: one functional human kidney for 5.7 million \$

# Living donor

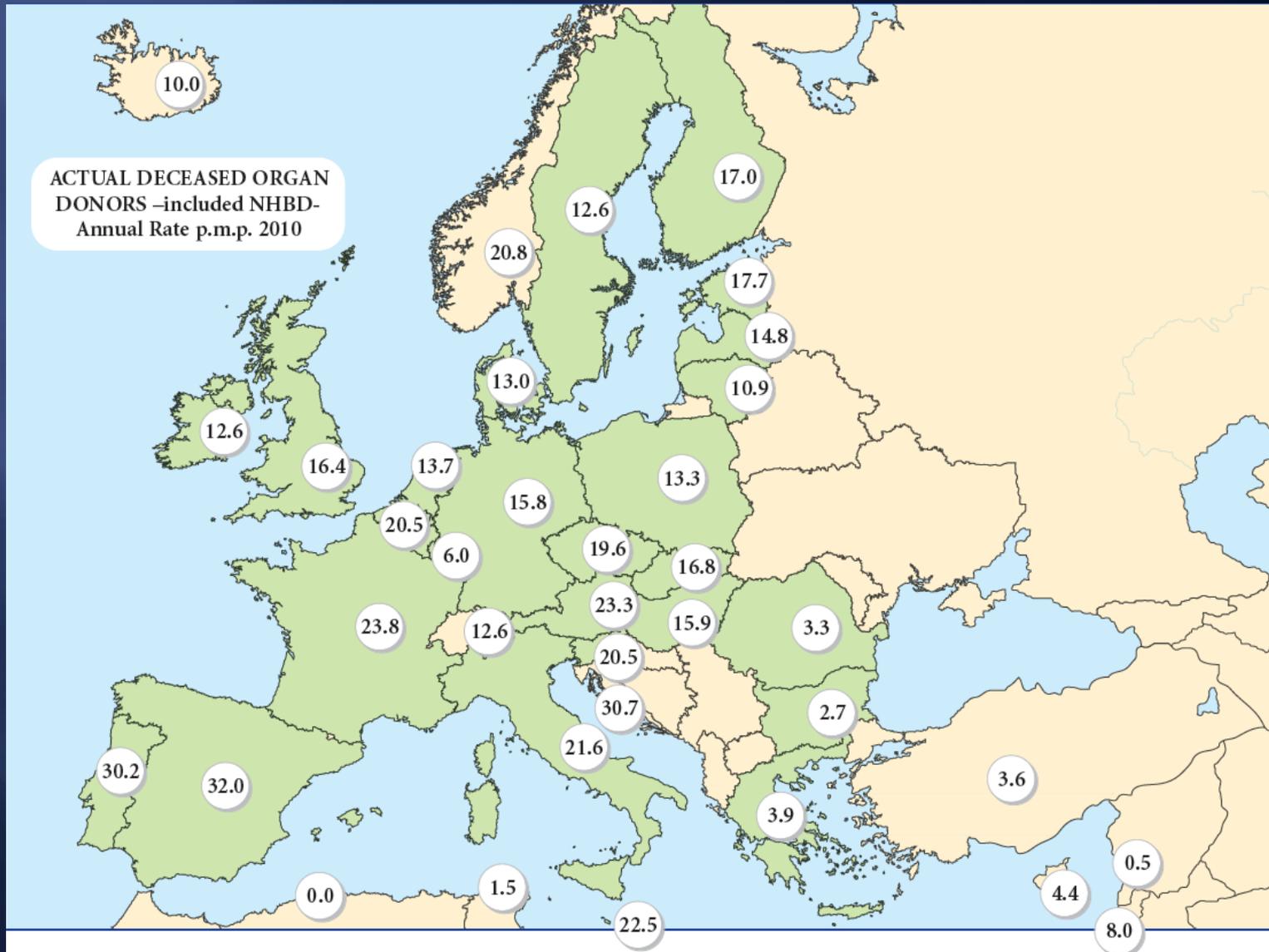
- ▣ **The procedure is safe (Amsterdam Forum)**
  - Mortality and morbidity similar or better than age-matched general population
  - Is the control group appropriate?
- ▣ **Registries mandatory**
  - In Poland 30% LD are reported
- ▣ **Follow-up mandatory**
  - Who should be responsible for follow-up?
  - Which tests should be done, how often?
  - Who pays for screening?
  - Compliance?



# Organs transplanted from living donors

- ▣ **Kidney**
  - ▣ Liver
  - ▣ Intestine
  - ▣ Lung
  - ▣ Pancreas
  - ▣ Bone marrow
- ▣ Age-related decline in renal function
  - ▣ No increase in blood pressure
  - ▣ GFR of 75-85% of normal
  - ▣ Renal failure rate similar to normal population
  - ▣ Donor death rate of 0.02-0.03 %
- ▣ Liver donor mortality 0.2%
  - ▣ Lower mortality with left lobe donation
  - ▣ Morbidity of 16%, with biliary and infectious complications being most common

# Deceased donors



# Possible deceased organ donor

A patient with a devastating brain injury or lesion or a patient with circulatory failure and apparently medically suitable for organ donation

## Donation after circulatory death (DCD)

### Potential DCD donor

- A. A person whose circulatory and respiratory functions have ceased and resuscitative measures are not to be attempted or continued.
- or
- B. A person in whom the cessation of circulatory and respiratory functions is anticipated to occur within a time frame that will enable organ recovery.

### Eligible DCD donor

A medically suitable person who has been declared dead based on the irreversible absence of circulatory and respiratory functions as stipulated by the law of the relevant jurisdiction, within a time frame that enables organ recovery.

### Actual DCD donor

A consented eligible donor:

- A. In whom an **operative incision** was made with the intent of organ recovery for the purpose of transplantation.
- or
- B. From whom at least **one organ was recovered** for the purpose of transplantation.

### Utilized DCD donor

An actual donor from whom at least one organ was transplanted.

Treating physician to identify/refer a potential donor

## Reasons why a potential donor does not become a utilized donor

### System

- Failure to identify/refer a potential or eligible donor
- Brain death diagnosis not confirmed (e.g. does not fulfill criteria) or completed (e.g. lack of technical resources or clinician to make diagnosis or perform confirmatory tests)
- Circulatory death not declared within the appropriate time frame.
- Logistical problems (e.g. no recovery team)
- Lack of appropriate recipient (e.g. child, blood type, serology positive)

### Donor/Organ

- Medical unsuitability (e.g. serology positive, neoplasia)
- Haemodynamic instability/unanticipated cardiac arrest
- Anatomical, histological and/or functional abnormalities of organs
- Organs damaged during recovery
- Inadequate perfusion of organs or thrombosis

### Permission

- Expressed intent of deceased not to be donor
- Relative's refusal of permission for organ donation
- Refusal by coroner or other judicial officer to allow donation for forensic reasons

## Donation after braindeath (DBD)

### Potential DBD donor

A person whose clinical condition is suspected to fulfill brain death criteria.

### Eligible DBD donor

A medically suitable person who has been declared dead based on neurologic criteria as stipulated by the law of the relevant jurisdiction.

### Actual DBD donor

A consented eligible donor:

- A. In whom an **operative incision** was made with the intent of organ recovery for the purpose of transplantation.
- or
- B. From whom at least **one organ was recovered** for the purpose of transplantation.

### Utilized DBD donor

An actual donor from whom at least one organ was transplanted.

\*The "dead donor rule" must be respected That is, patients may only become donors after death, and the recovery of organs must not cause a donor's death

# Deceased donor – consent

- ▣ Opt-in (direct consent)
  - ▣ Donor registries
  - ▣ Donor card/ driver's license
  - ▣ Living Wills
  - ▣ Mandated choice
  - ▣ Family/ legal representative consent
- ▣ Opt-out (presumed consent) (24 EU countries)
  - ▣ Registries
  - ▣ Sharing the views with family and friends
  - ▣ „Soft“ presumed consent

# Deceased donor

- ▣ Detailed medical and social history
- ▣ Complete physical examination
- ▣ Review of current hospital course
- ▣ Organ-specific function
- ▣ Age
- ▣ Infectious disease status
- ▣ Screen for malignancy (actual and history of)

# Contraindications to donation

## ABSOLUTE

- ▣ Transmissible infections
  - HIV, HTLV I, active HBV, West Nile virus, encephalitis of unknown reason, Creutzfeldt –Jakob disease, malaria, tuberculosis
- ▣ Active neoplasm
- ▣ Signs that organ will not function

## RELATIVE

- ▣ Donor age
- ▣ Systemic bacterial infection
- ▣ Syphilis
- ▣ HBV infection
- ▣ HCV
- ▣ End-organ disease

# Brain-dead donor

- ▣ Cerebral insults (SAH, SDH, CVA) 60%
- ▣ Severe head injuries 30%
- ▣ Primary brain tumors 2%
- ▣ Other 8%
  - Cerebral anoxia (near drowning, drug overdose, myocardial infarction with CA)
  - Homicides/suicides
  - Hypothermia
  - Metabolic disorders (DKA)



# Brain dead donor

- ▣ Patient on mechanical ventilation, heart beating
- ▣ Absence of spontaneous movements and response to stimulus
- ▣ Absence of spontaneous respiration
- ▣ Absence of brain stem reflexes
- ▣ Excluded reversible etiology



# Expanded criteria donor – UNOS definition

- ▣ >60 years old
  
- ▣ >50 years old + 2 of the following:
  - Hypertension
  - Serum creatinine >1.5 mg/dL
  - Death from CVA

| ECD                     | SCD         |
|-------------------------|-------------|
| Half-life 6-8 years     | 10-12 years |
| 43% of WL               |             |
| Consent?                |             |
| 18% higher chance of Tx |             |

# ECDs

- ▣ Donors with medical complexities
- ▣ Organs underutilized:
  - HCV infection
  - Other infections, unusual
  - Obesity
  - Catecholamine dependent

# Inferiority of BDD organs

## PATHOPHYSIOLOGY

- ▣ **I phase : increase of intracranial pressure:** ↑ of catecholamines, ↑ of sympathetic system activation, ↑ blood pressure, ↑ vascular resistance, ↓ CO
- ▣ **II phase: after stem death:** ↓ loss of vascular wall tension, ↓ CVP, ↓ venous return and CO, ↓ HR

## GOALS OF DONOR TREATMENT

- ▣ **SAP > 100 mmHg**
- ▣ **MAP > 50 mmHg**
- ▣ **CVP 8 - 12 cm H<sub>2</sub>O**
- ▣ **diuresis 1- 1,5 ml / kg / hour**
- ▣ **Na <160**

# Non-heart beating donors

- ▣ Circulatory definition of death: not all cells die immediately

## Maastricht categories:

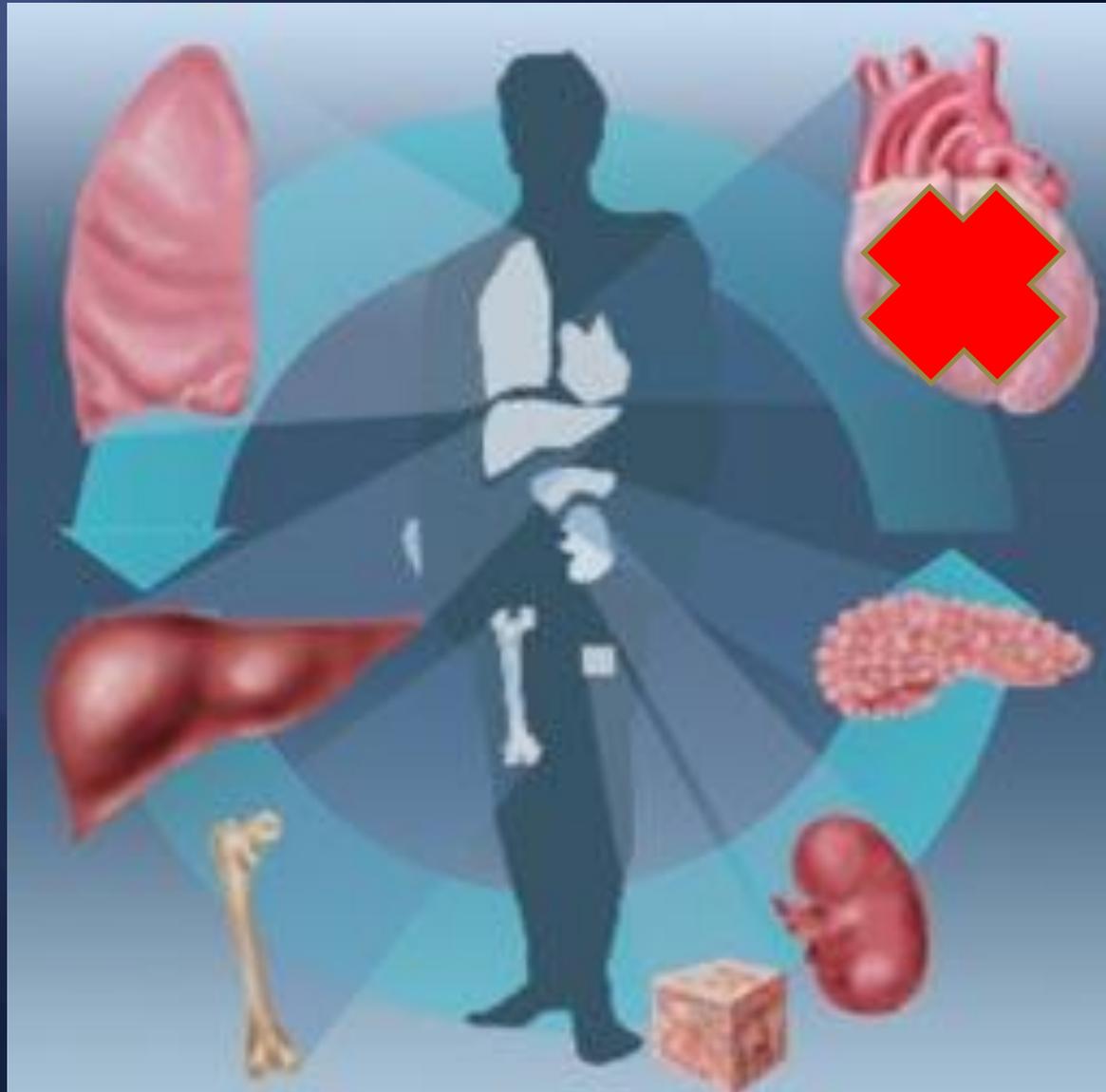
- I dead on arrival
- II unsuccessful resuscitation
- III **awaited cardiac arrest**
- IV CA in a brain-dead patient

# Criteria of irreversible CA (Poland)

- ▣ Min. 20 minutes resuscitation
- ▣ No spontaneous pulse at any time
- ▣ 5 min observation
  - No spontaneous pulse
  - Asystole or electromechanical dissociation
  - No brain stem reflexes
    - Reaction to the light
    - Corneal reflex
    - Oculocephalic reflex
    - Pain reaction
    - Respiratory function

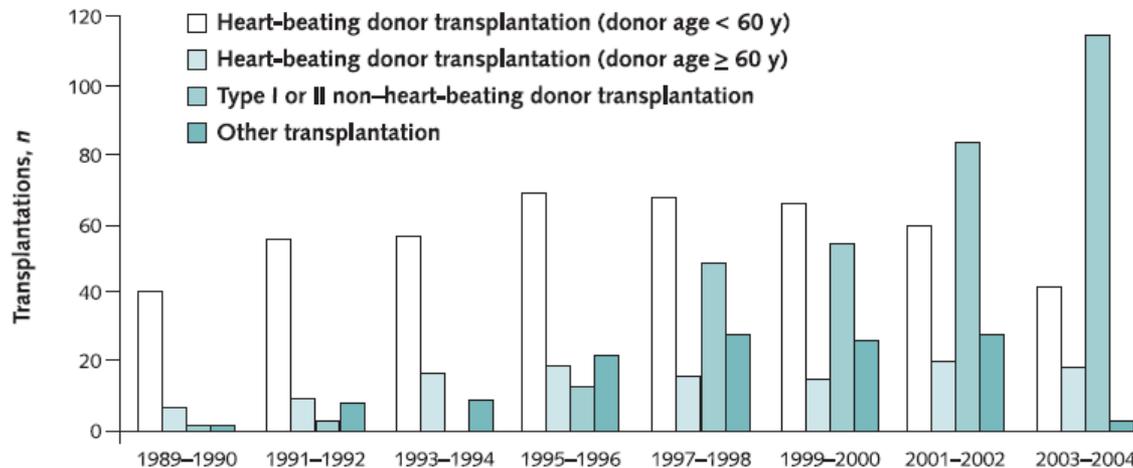


# Organs retrieved from NHBD



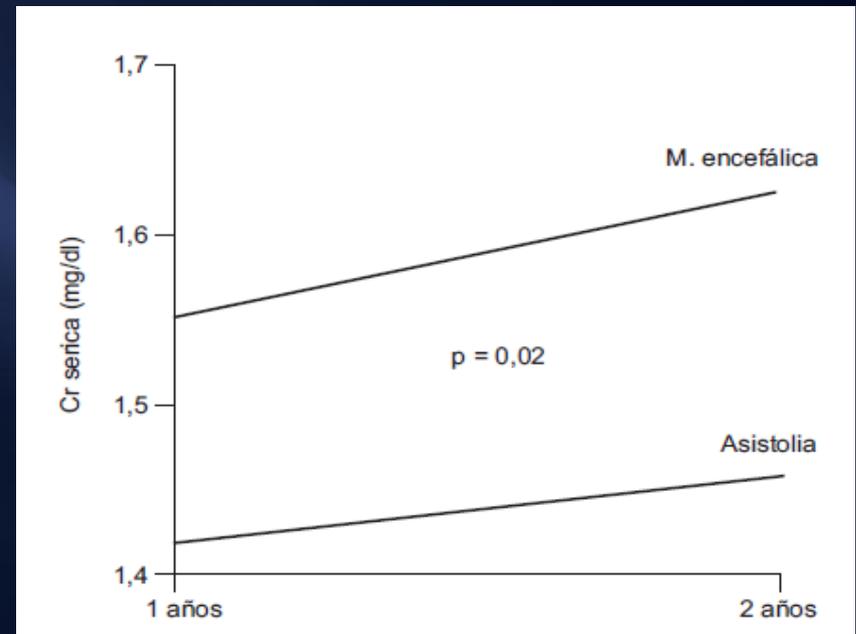
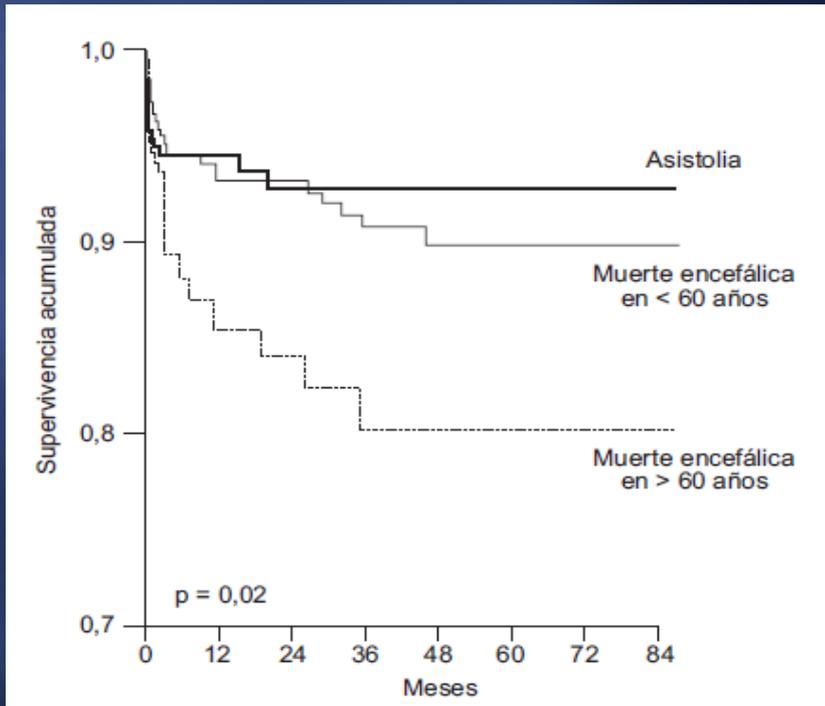
# Benefits: no. of transplants

Figure 1. Kidney transplantations at the Hospital Clínico San Carlos, Madrid, Spain, January 1989–December 2004.



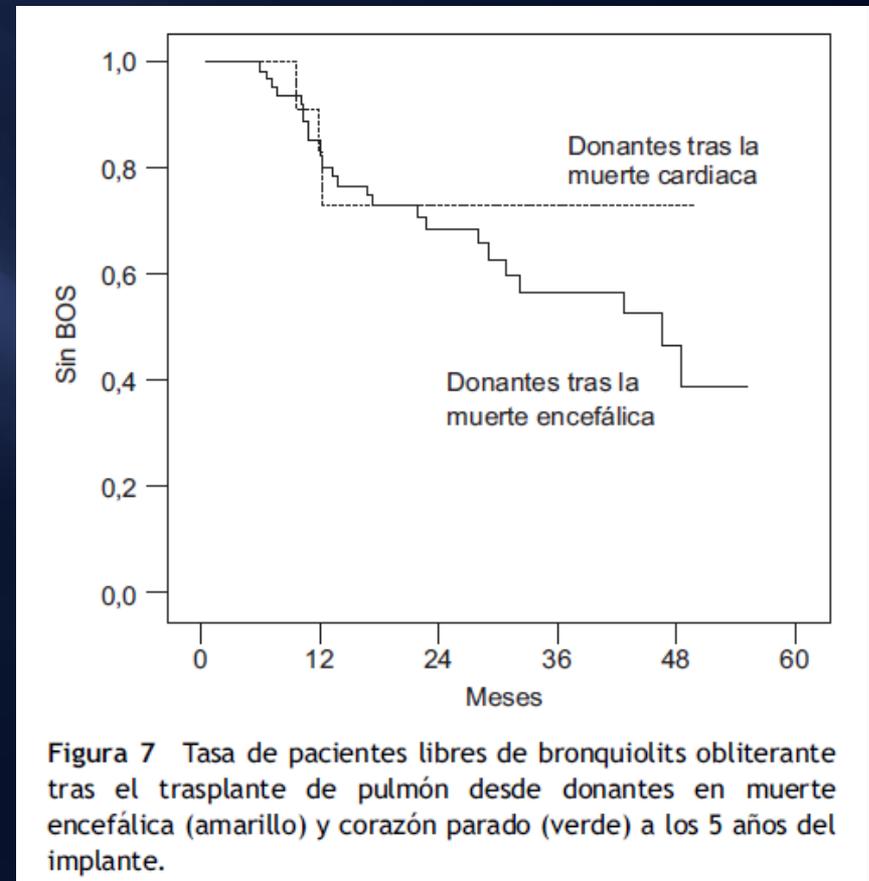
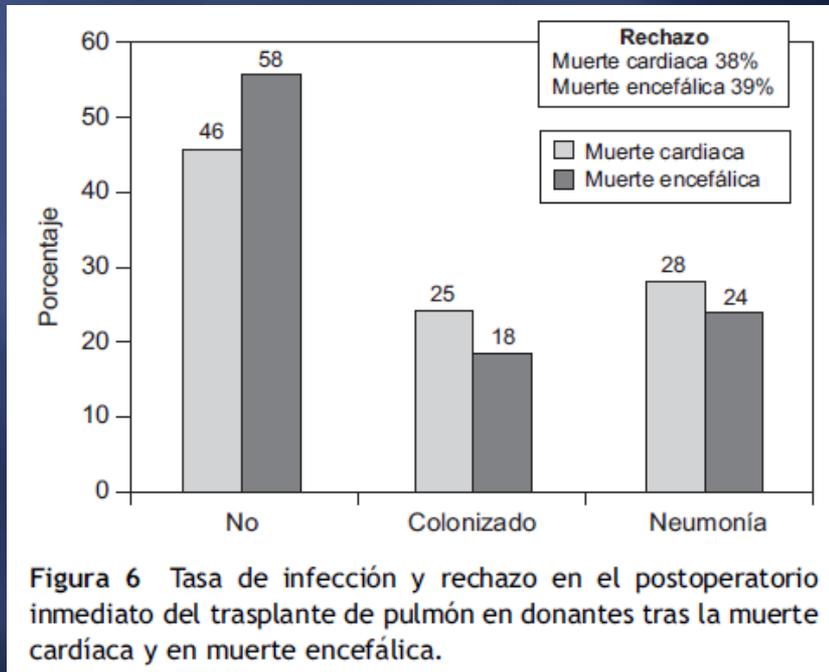
“Other transplantations” are those involving other than single adult cadaveric heart-beating donors (en bloc pediatric renal transplantations or double renal transplantations from donors  $\geq 60$  years of age) and those involving types III, IV, and V non-heart-beating donors.

# Post-Tx renal function



F.Del Rio-Gallegos, J.L.Escalante-Cobo, J.R.Nunez-Pena y E.Calvo-Manuel: Donacion tras la muerte cardiaca. Parada cardiaca en el mantenimiento del donante en muerte encefalica. Med Intensiva.2009;33(7):327-335

# Lung Tx



# Religious aspects

- ▣ All major religions accept organ donation
  - Roman Catholic Church: donation as an act of charity saves lives
  - Muslims require informed consent of the donor signed in advance
  - Jehovah's Witnesses: organs must be drained of any blood
  - In Jewish religion organs can be retrieved after cessation of a heartbeat
  
- Few are against: Shinto, Gypsies

## GLOBAL DATA

| WHO Region (N) <sup>1</sup> | Kidney N (pmp) <sup>2</sup>                               | Liver N (pmp) <sup>2</sup>                              | Heart N (pmp) <sup>2</sup> | Lung N (pmp) <sup>2</sup> | Pancreas N(pmp) <sup>2</sup> | Total N(pmp) <sup>2</sup> |
|-----------------------------|---|---|----------------------------|---------------------------|------------------------------|---------------------------|
| <b>AFR (9)</b>              | LD: 323 (0.8)<br>DD: 140 (0.3)                            | LD: 5 (0.01)<br>DD: 37 (0.09)                           | 26 (0.06)                  | 8 (0.02)                  | 11 (0.03)                    | 550 (1.3)                 |
| <b>AMR (21)</b>             | LD: 11036 (12.1)<br>DD: 16692(18.4)                       | LD: 336 (0.4)<br>DD: 8405 (9.2)                         | 2784 (3.1)                 | 1913 (2.1)                | 1393 (1.5)                   | 42743 (47.0)*             |
| <b>EMR (14)</b>             | LD: 5032 (10.1)<br>DD: 550 (1.1)                          | LD: 192 (0.4)<br>DD: 223 (0.4)                          | 61 (0.1)                   | 10 (0.02)                 | 20 (0.04)                    | 6088 (12.3)               |
| <b>EUR (38)</b>             | LD: 5597 (7.2)<br>DD: 16116 (20.7)                        | LD: 583 (0.75)<br>DD: 6994 (9.0)                        | 2239 (2.9)                 | 1535 (2.0)                | 824 (1.05)                   | 33942 (43.6)**            |
| <b>SEAR (9)</b>             | LD: 5496 (3.1)<br>DD: 305 (0.17)                          | LD: 403 (0.23)<br>DD: 105 (0.06)                        | 13 (0.007)                 | -                         | -                            | 6322 (3.6)                |
| <b>WPR (11)</b>             | LD: 5313 (3.0)<br>DD: 4818 (2.7)                          | LD: 1760 (1.0)<br>DD: 1984 (1.1)                        | 280 (0.16)                 | 183 (0.10)                | 68 (0.04)                    | 14420 (8.2)***            |
| <b>TOTAL (102)</b>          | <b>71418 (11.6)</b><br>LD: 32797 (5.3)<br>DD: 38621 (6.3) | <b>21027 (3.4)</b><br>LD: 3279 (0.5)<br>DD: 17748 (2.9) | <b>5403 (0.9)</b>          | <b>3649 (0.6)</b>         | <b>2316 (0.4)</b>            | <b>104065 (17.0)****</b>  |