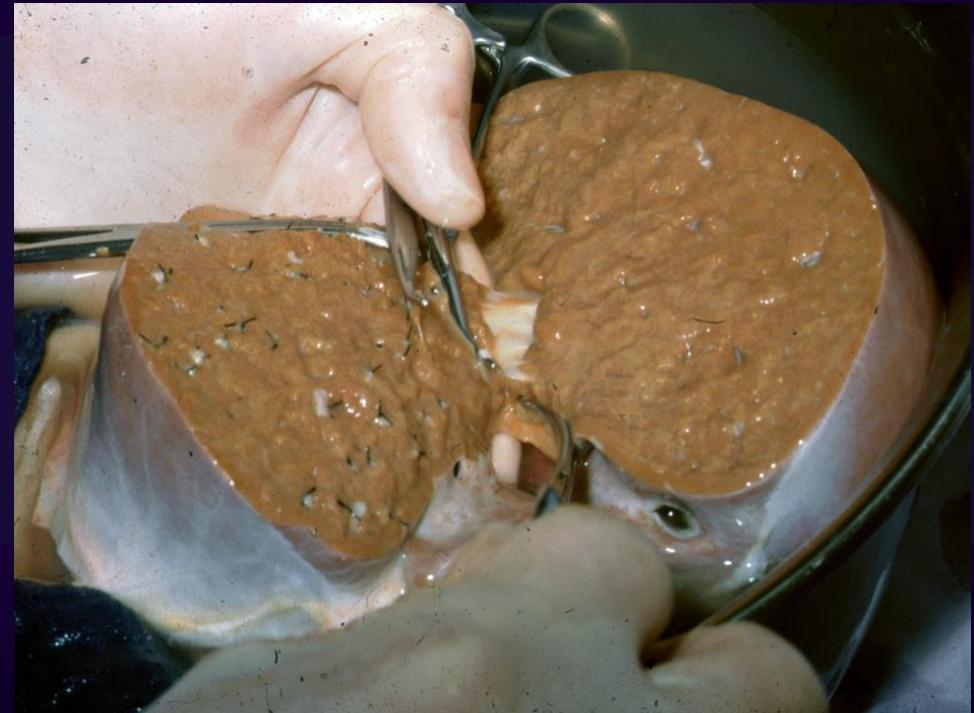


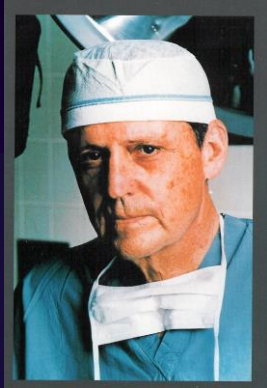
SPLIT LIVER TRANSPLANTATION

Focus on Children



Jean de Ville de Goyet

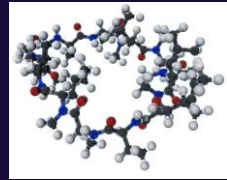
Historical Landmarks



T. STARZL

First clinical
Transplant

3 yrs old
BA



CsA



SPLIT

LRD

30 years

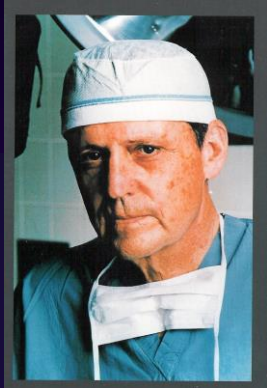
1963

1980

1989

1990

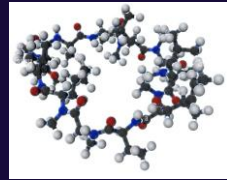
Historical Landmarks



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CsA



SPLIT

LRD

1963

1980

1989

1990

30 years

30 years

1991

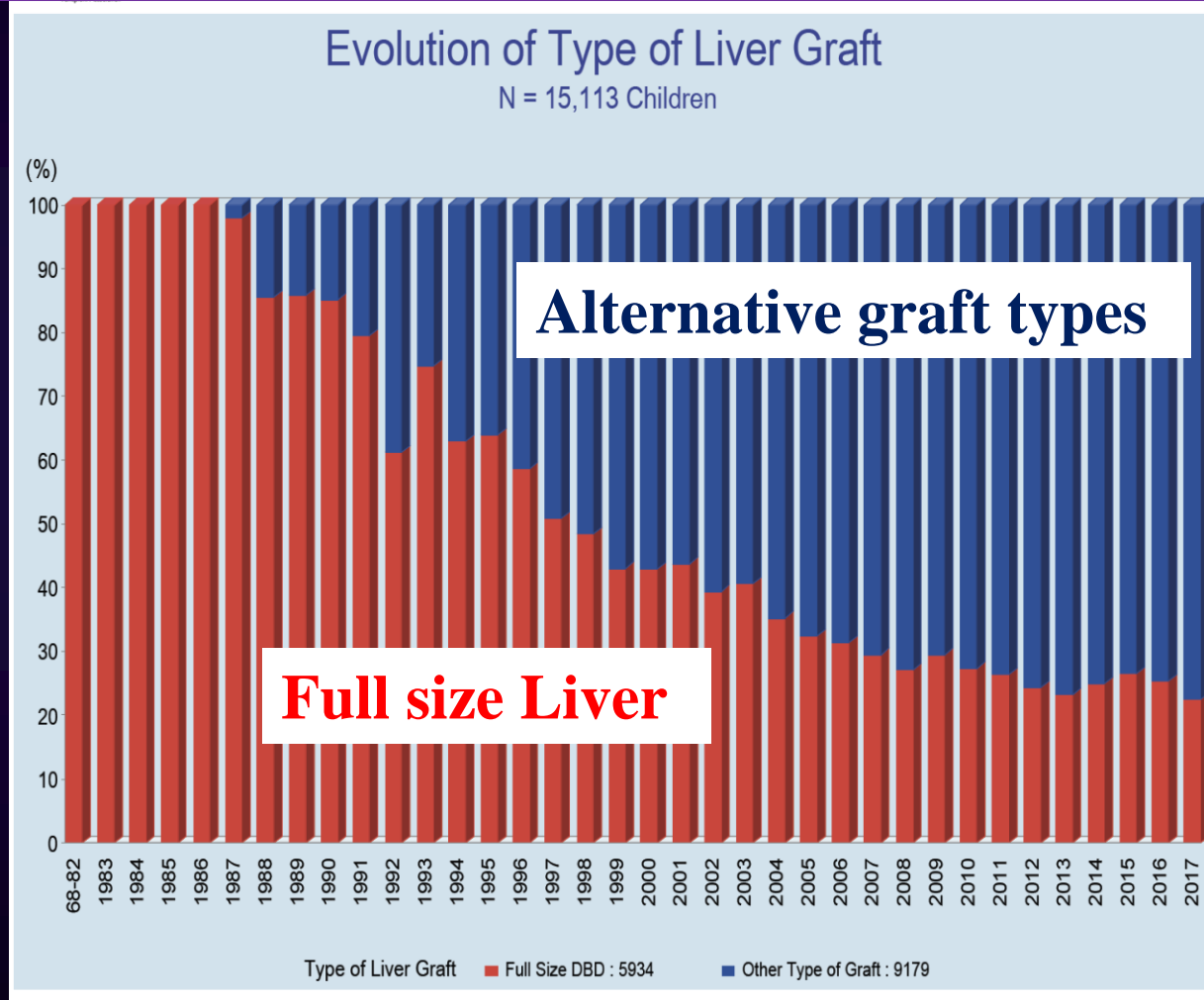
...

.....

2022

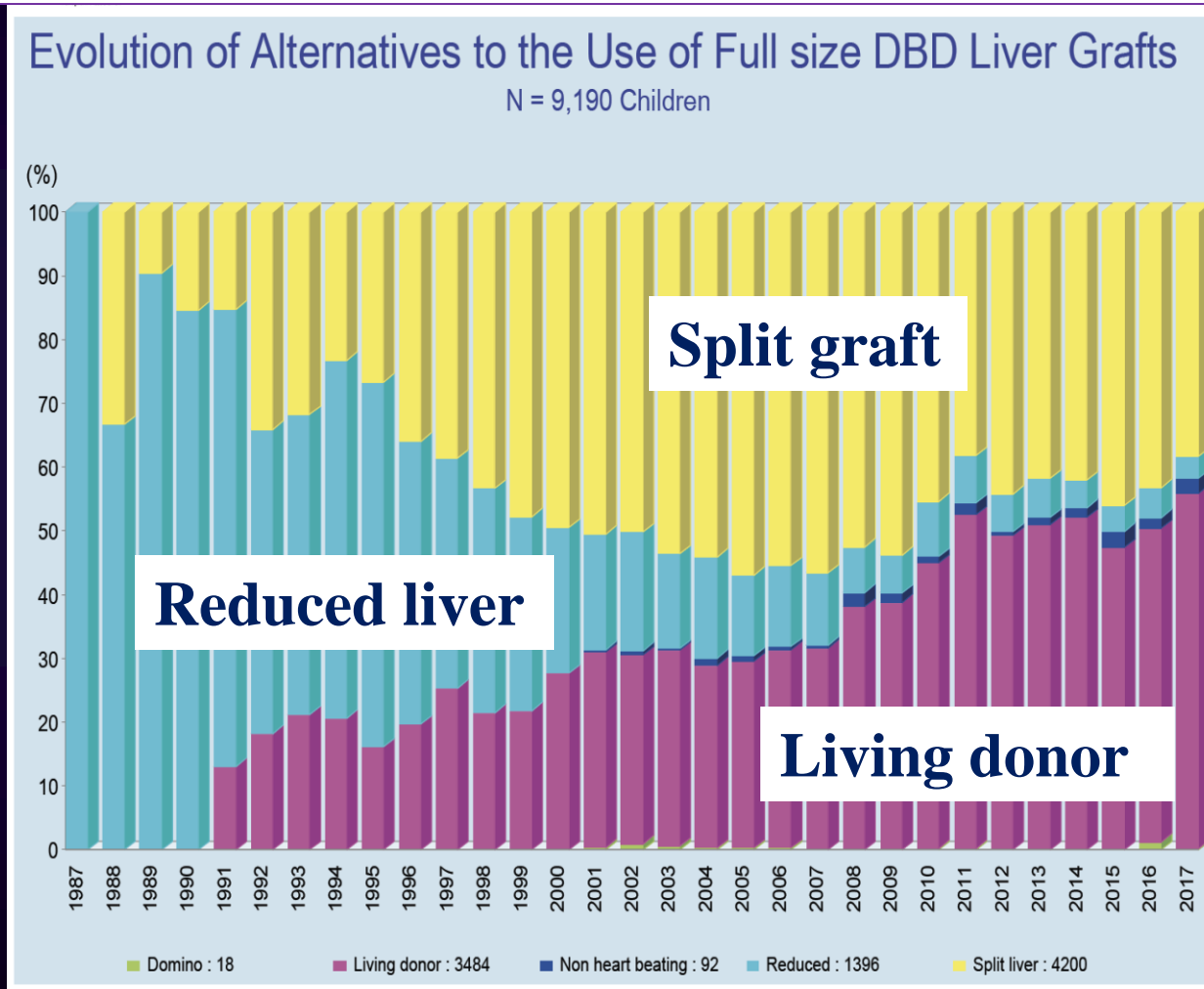
Europe - Continuing organ shortage

Graft types in Pediatric liver Transplantation



Europe - Continuing organ shortage

Graft types in Pediatric liver Transplantation



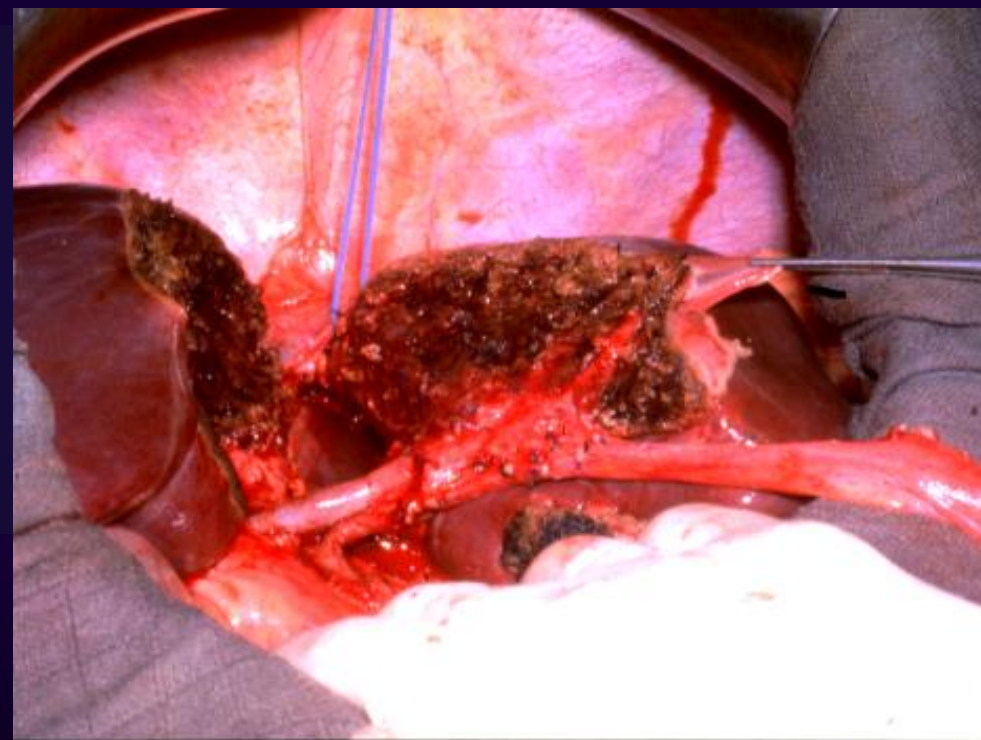
The TECHNIQUES

1

Ex-situ



In-situ



Ex-situ

Logistics	Single donor Team Split at Tx center Transfert of second graft	
Assessment	detailed	
Hemostasis	partial	
Ischemic time	prolonged	
Adaptable	+ + +	

Ex-situ

In-situ

Logistics

Single donor Team
Split at Tx center
Transfert of second graft

Two teams
in donor hospital

Assessment

detailed

limited

Hemostasis

partial

excellent

Ischemic time

prolonged

standard

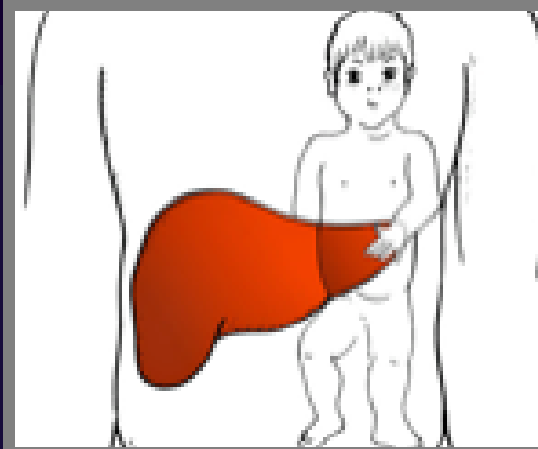
Adaptable

+ + +

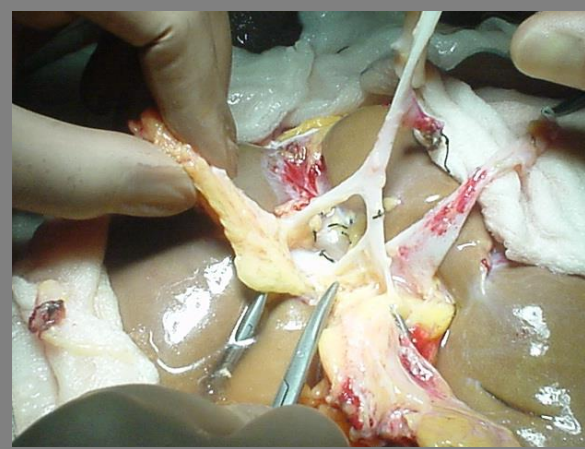
+/-

Split Ex-Situ Back-Table assessment +/- Imaging

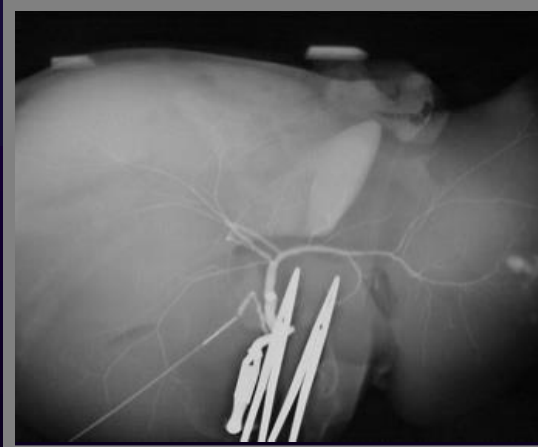
Macro +
Compare
Weight



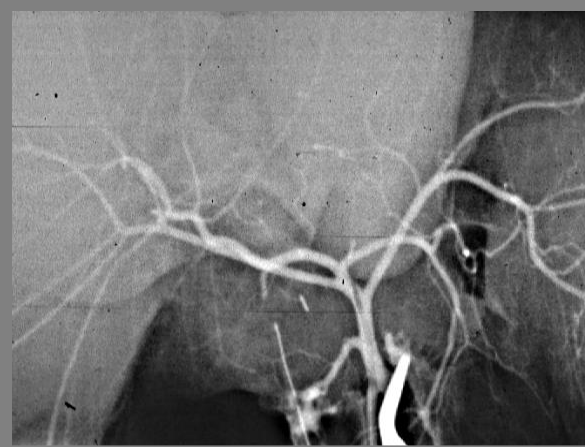
Explore



Cholangio

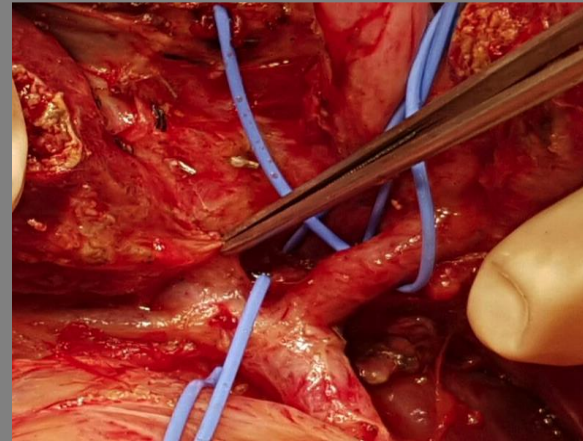
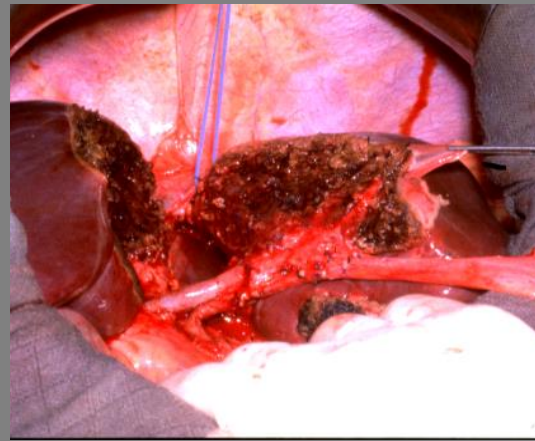


Angio



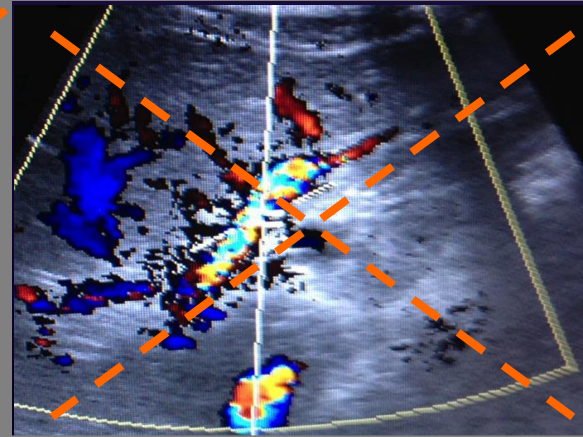
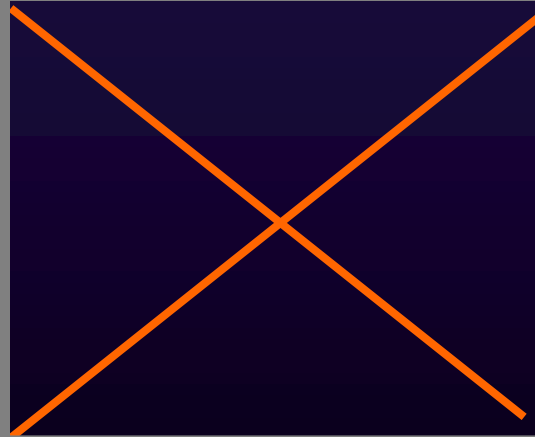
Split In-Situ Extemporaneous Surgical assessment

Macro



Limited
exploration

NO
Cholangio



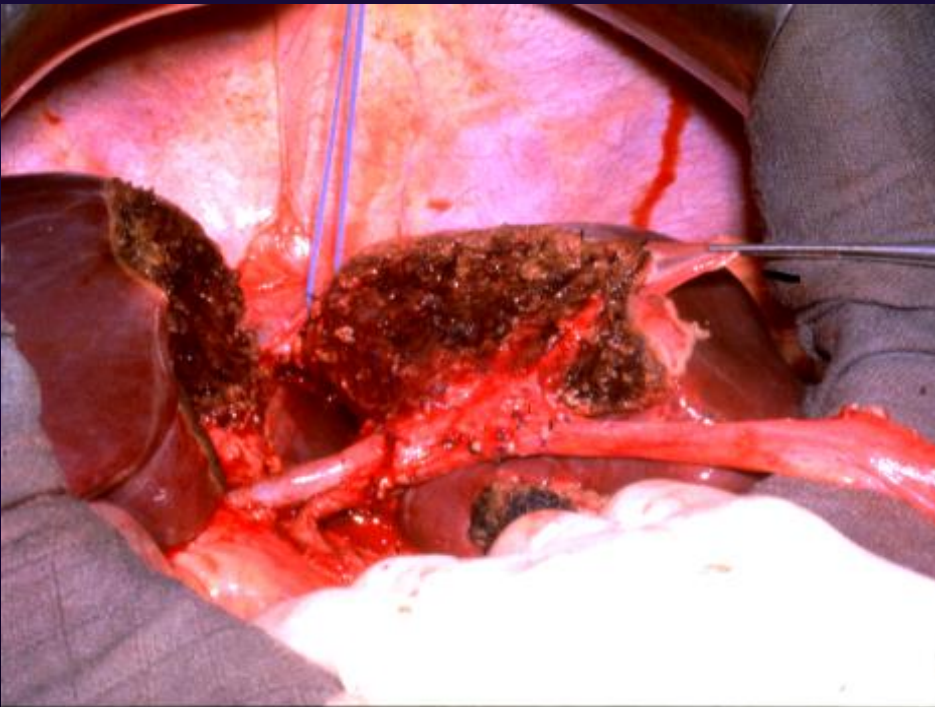
Usually
NO
Angiografia

? TAC

? USD

In-situ splitting in deceased donor

*Split at Procurement in
The donor hospital*

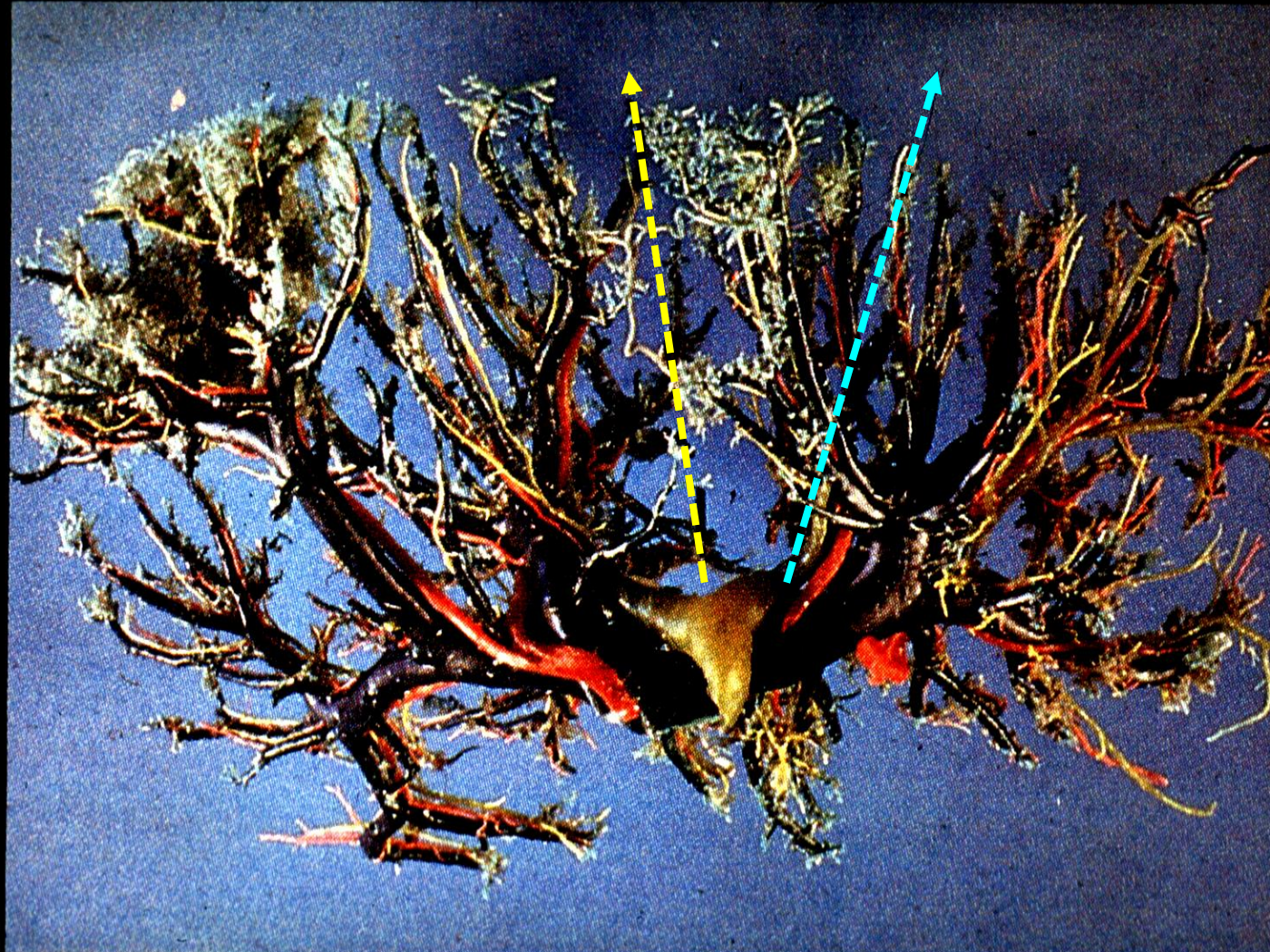


*The Liver graft is READY to implant
as it arrived in recipient hospital*

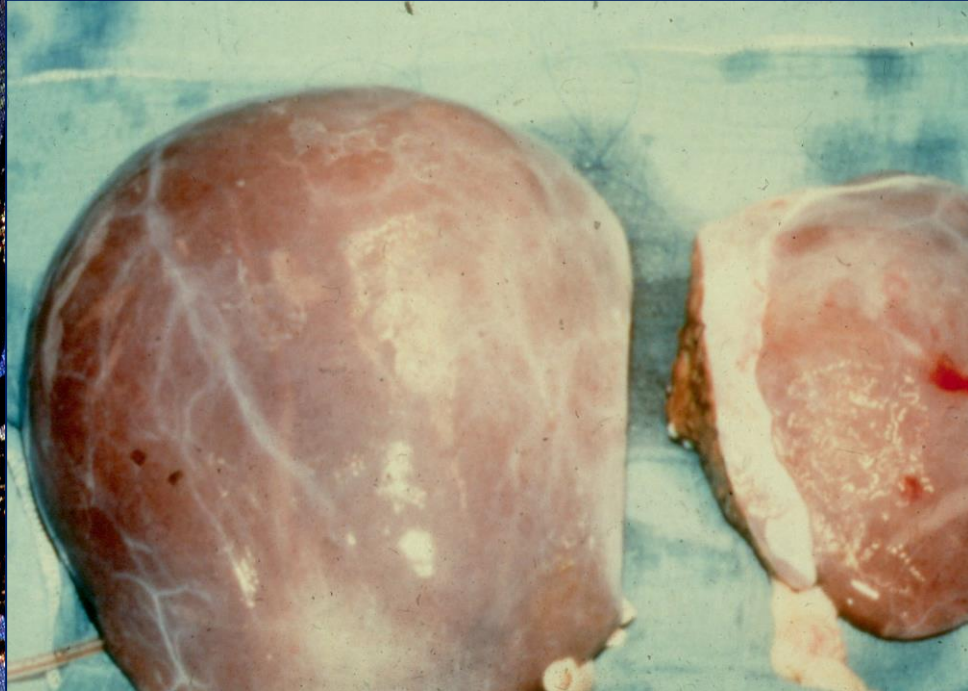
The TECHNIQUES

2

LIVER DIVISION TYPES



LIVER DIVISION TYPES



3

TECHNICAL VARIATIONS

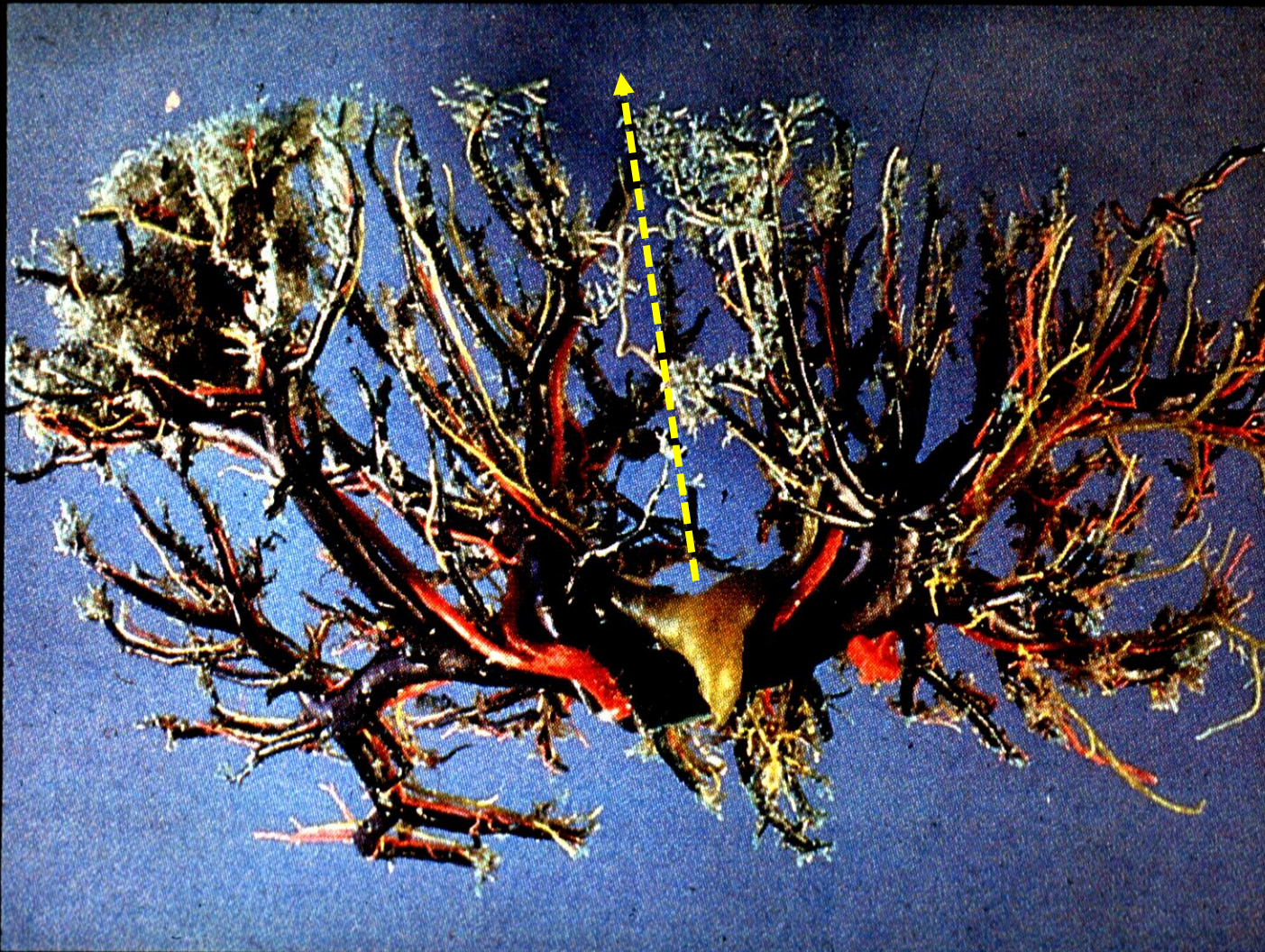
and

MOST COMMON LIVER DIVISION

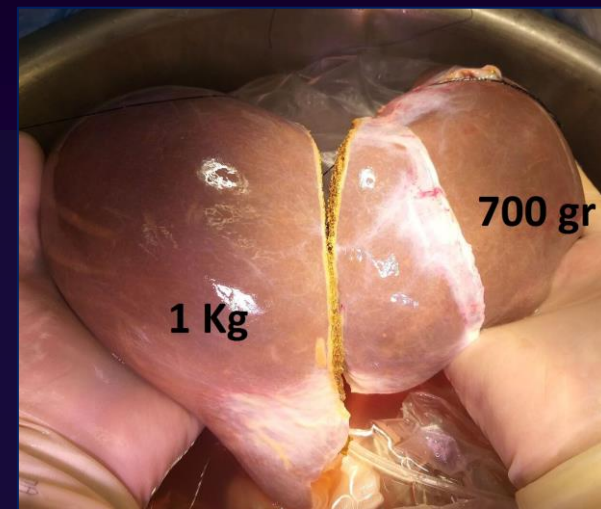
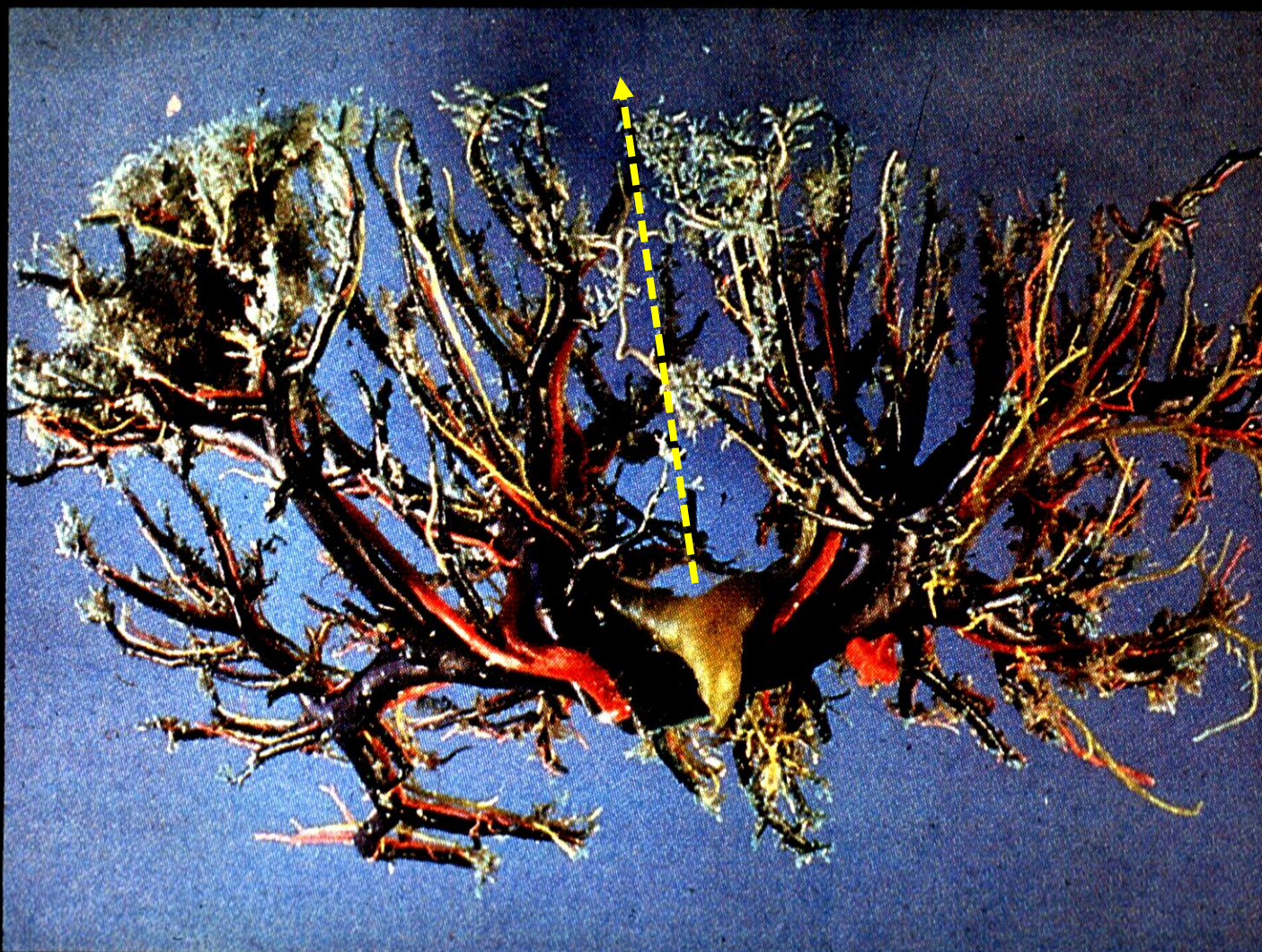
1

The middle Hepatic Vein... dilemma

The middle Hepatic Vein... dilemma



The middle Hepatic Vein... dilemma

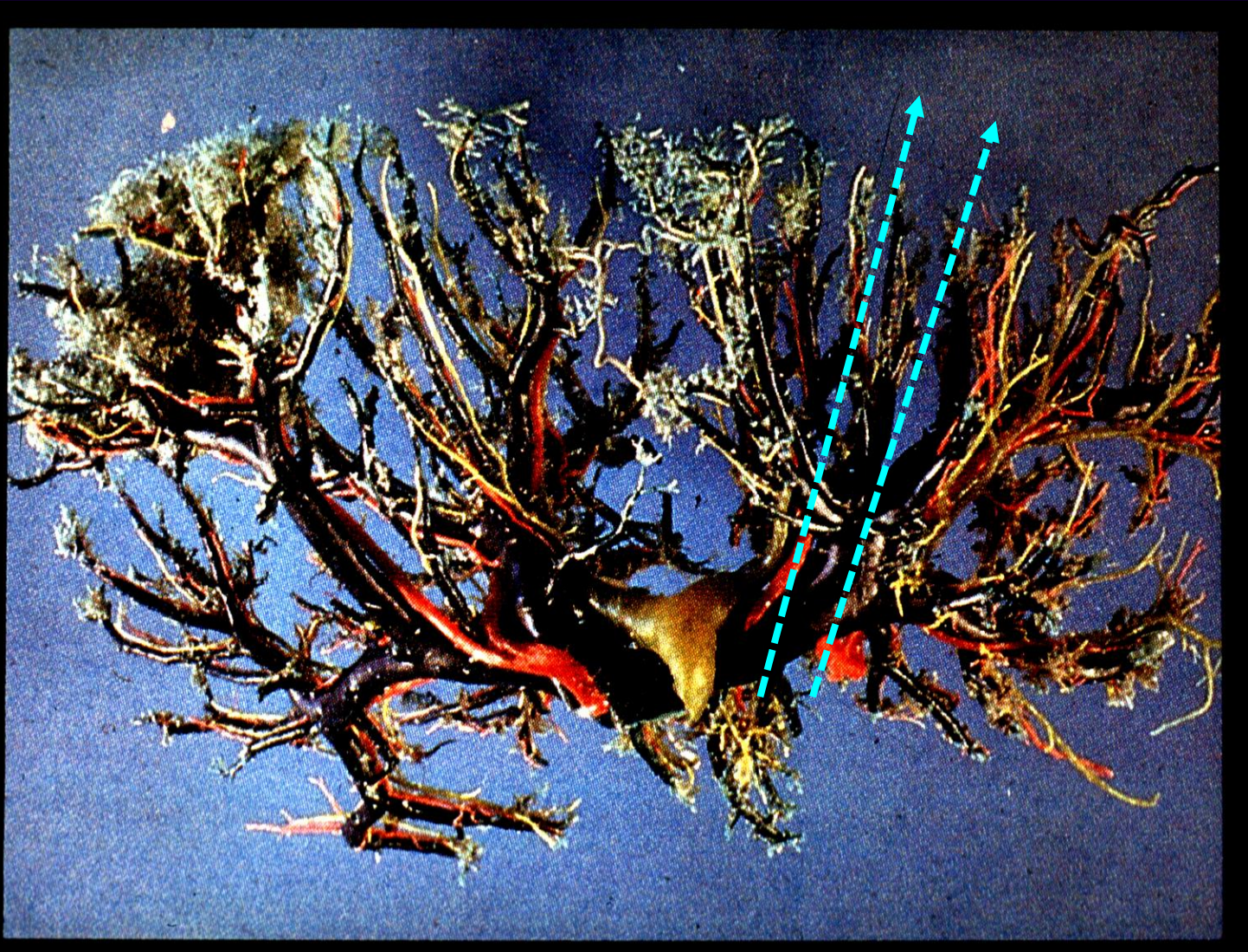


2

MOST COMMON LIVER SPLITTING
Lefl liver lobe + Extended right liver

MOST COMMON LIVER SPLITTING

Left liver lobe + Extended right liver



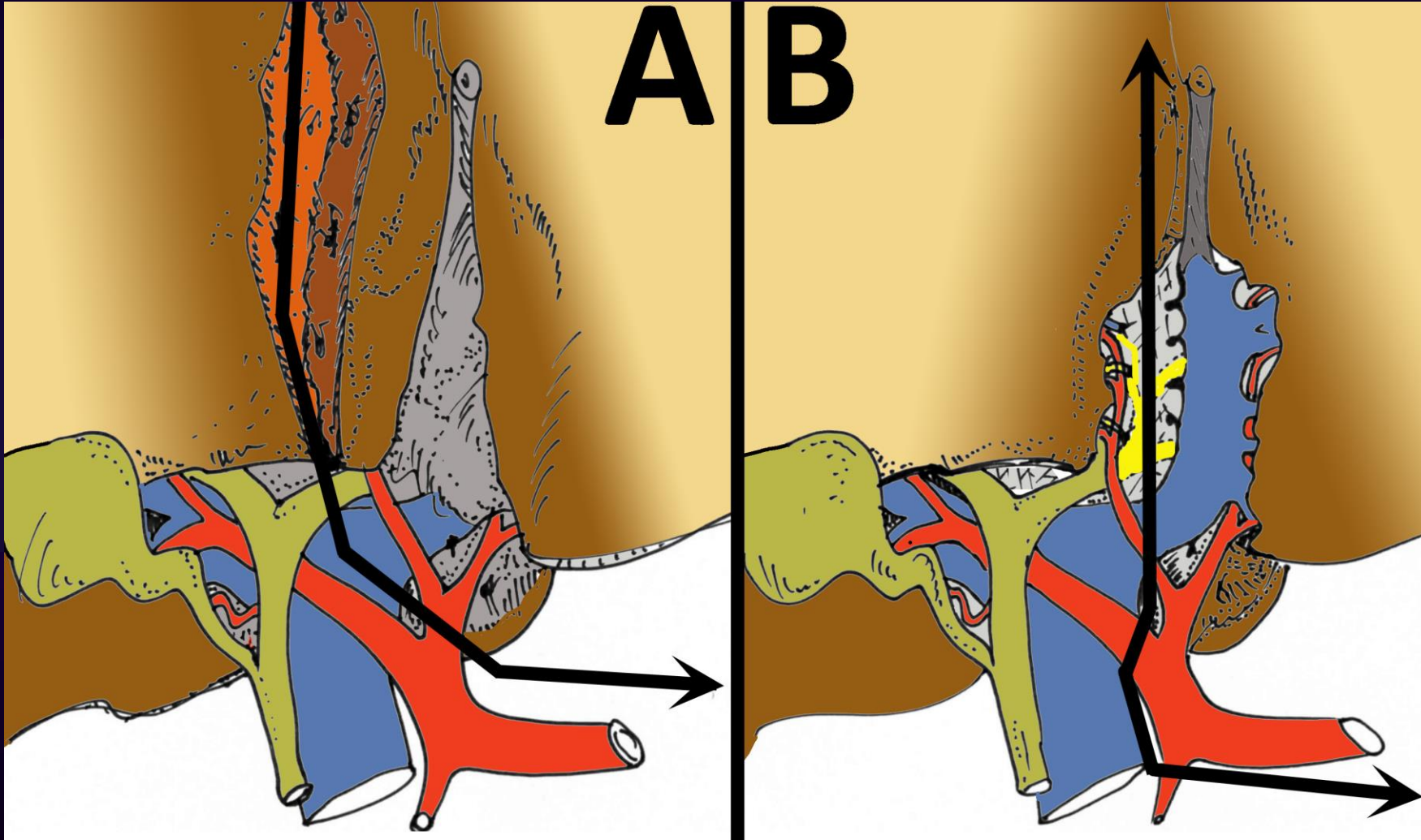
Left lobe liver split graft is the most common split graft (Seg. II + III) =

- around 300 gr of liver
- with a relatively small cut surface
- and fitting well in the abdomen of most infants

Most frequent division line for
In-situ in deceased donor

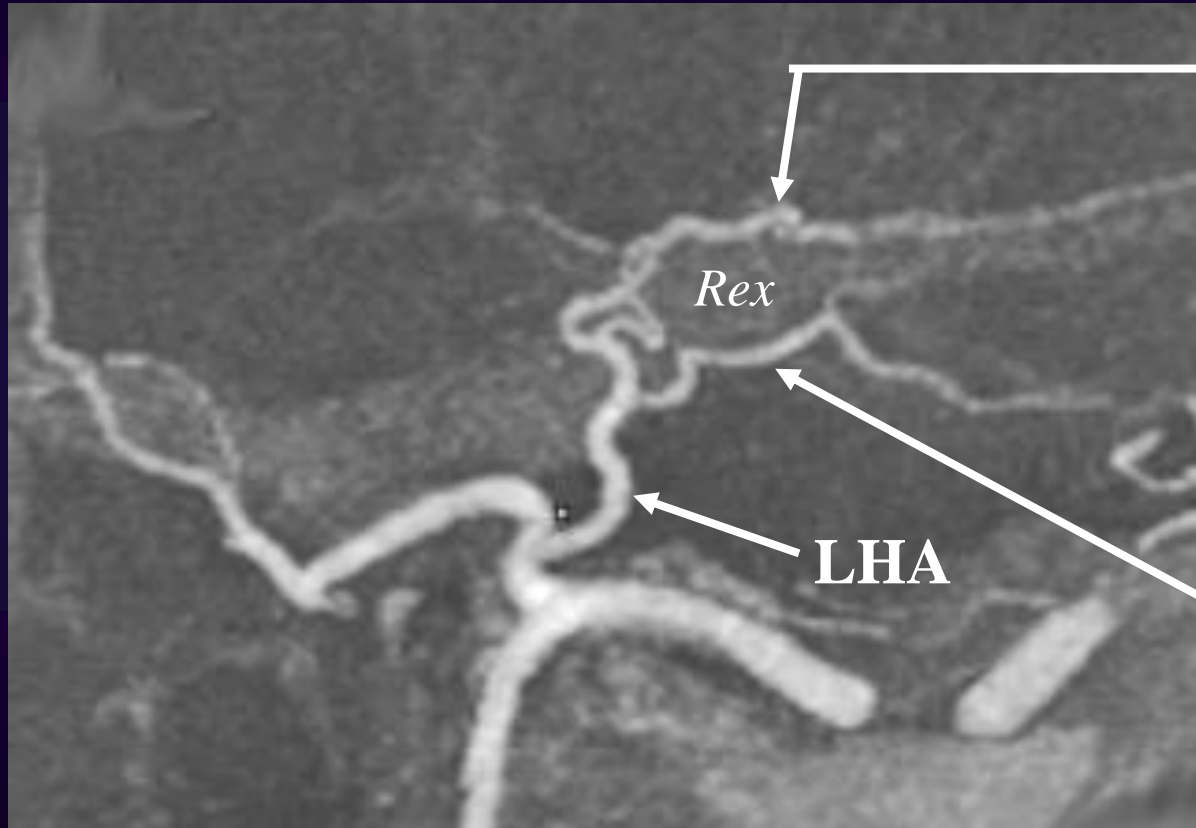
Trans-hilar

Trans-ombilical



Trans-hilar

Trans-ombilical



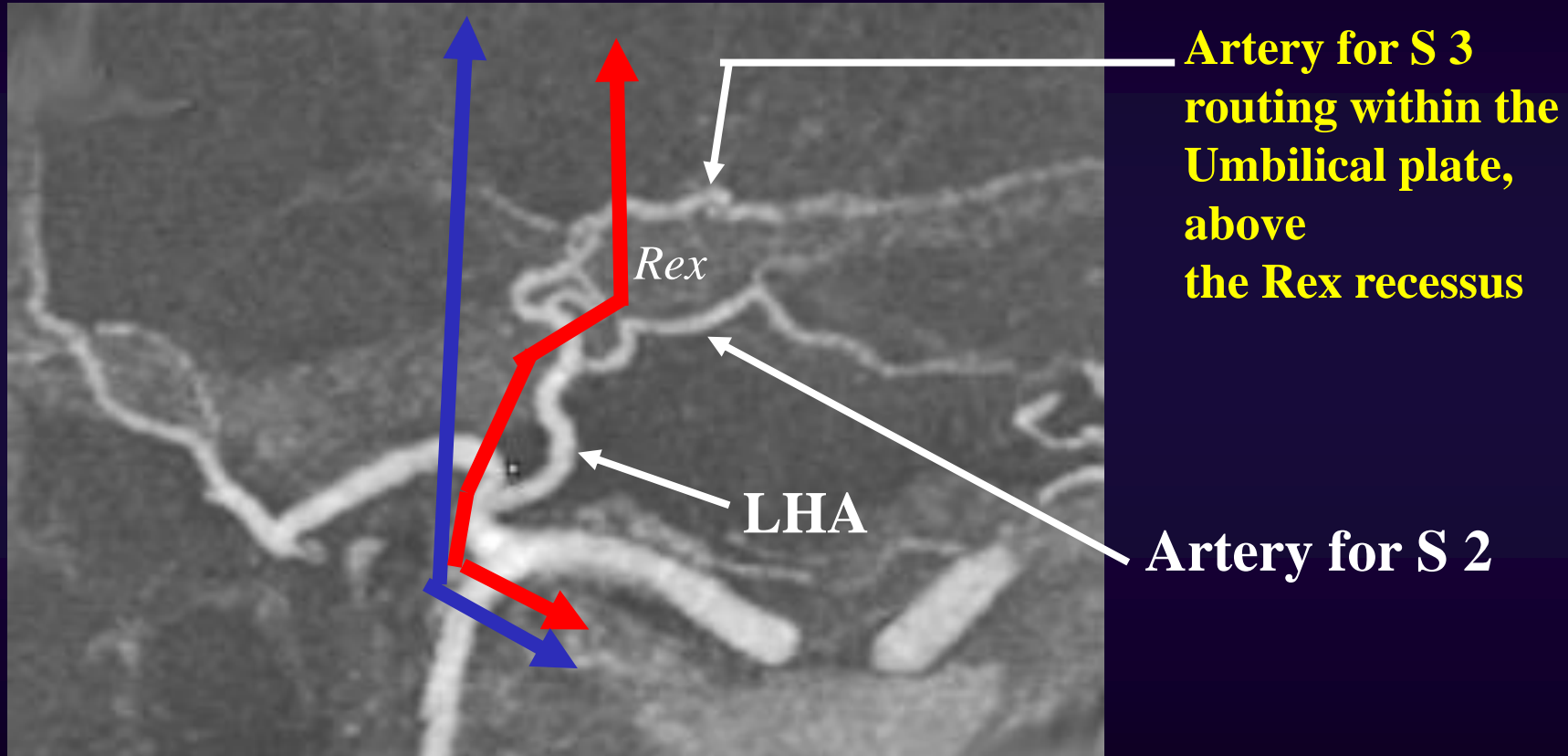
Artery for S 3
routing within the
Umbilical plate,
above
the Rex recessus

Artery for S 2

At surgical exploration = 1 LHA with a bifurcation...for LLS...!?

Trans-hilar

Trans-ombilical

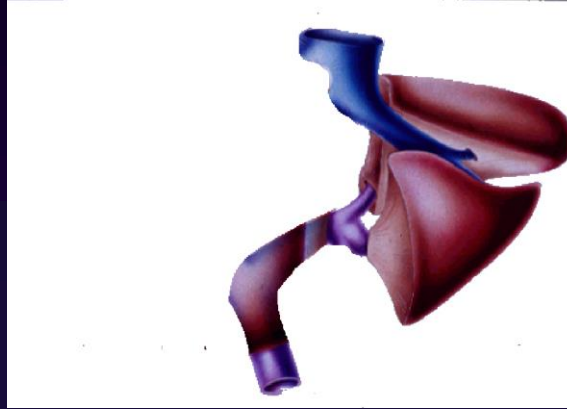


At surgical exploration = 1 LHA with a bifurcation...for LLS...!?

4 !

More about VARIATION of TECHNIQUE

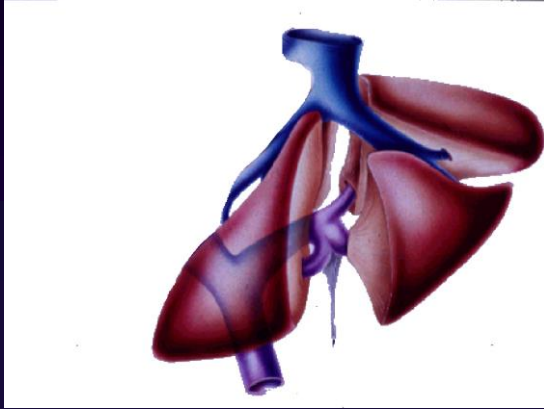
Adapt to Recipient needs ...



STANDARD LLS (2+3)



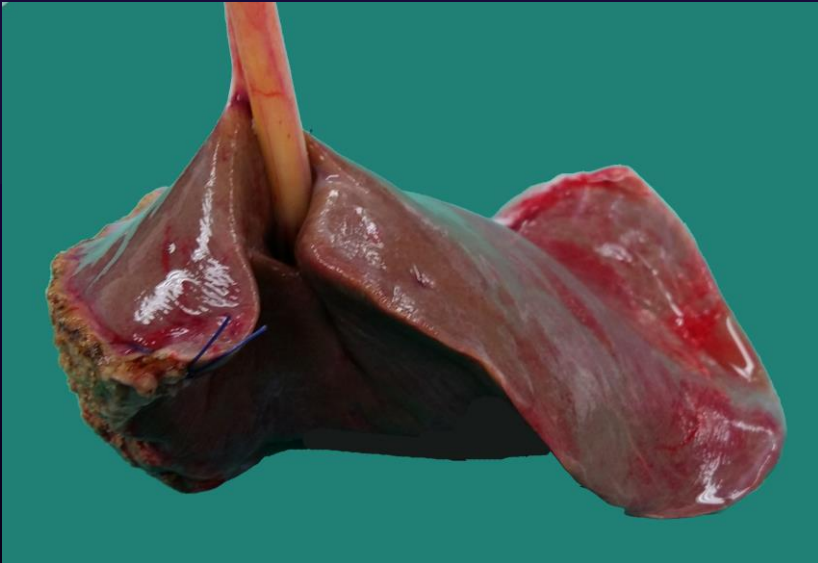
Adapt to Recipient needs ...



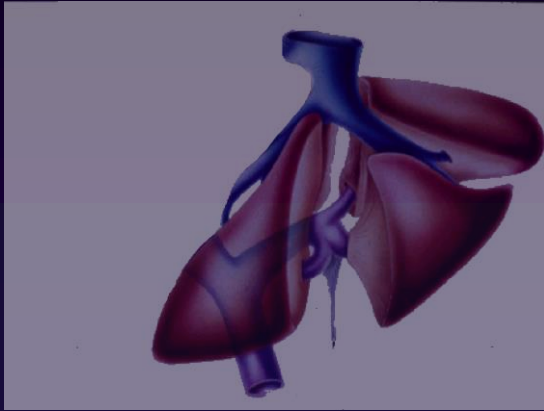
Extended LLS (2+3+4)



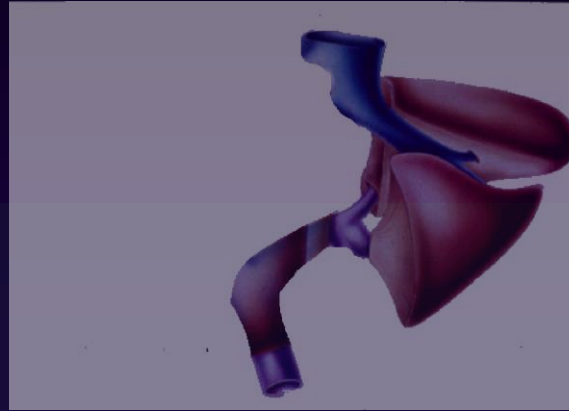
STANDARD LLS (2+3)



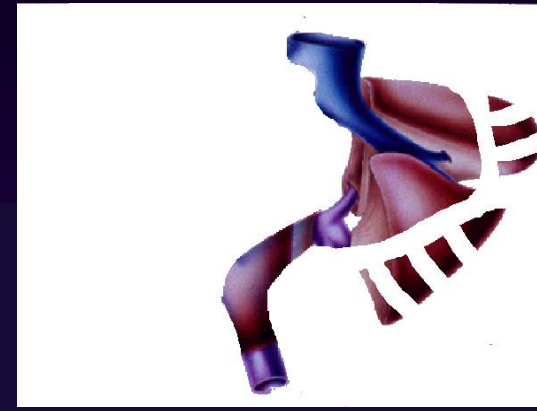
Adapt to Recipient needs ...



Extended LLS (2+3+4)



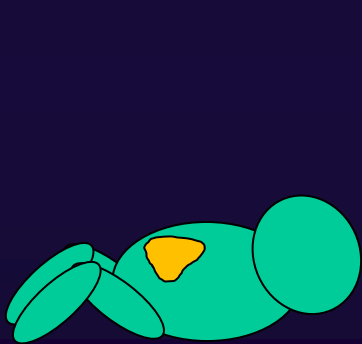
STANDARD LLS (2+3)



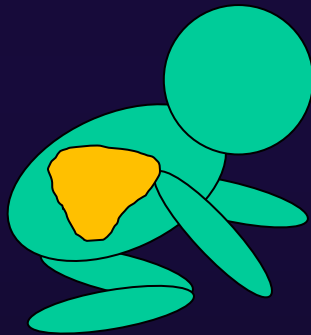
Reduced LLS graft



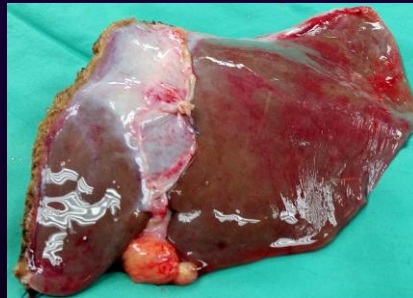
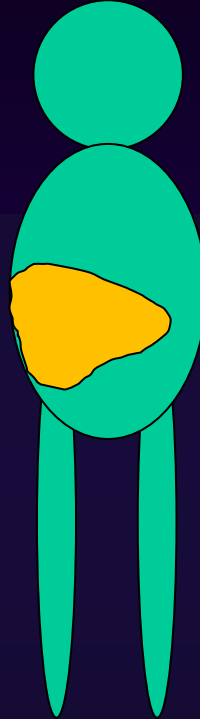
Adapt to Recipient needs ...



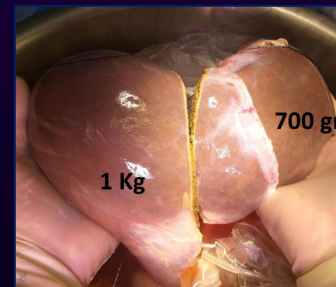
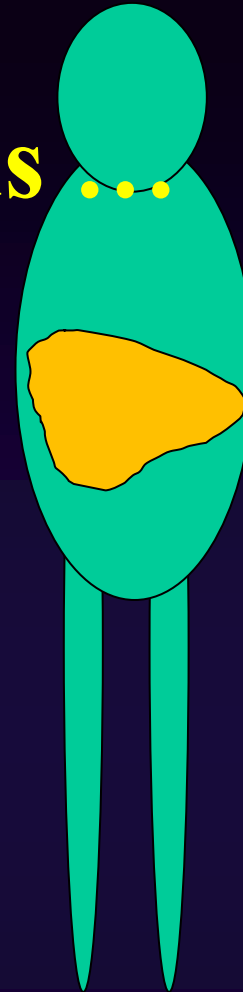
0



5



15



35

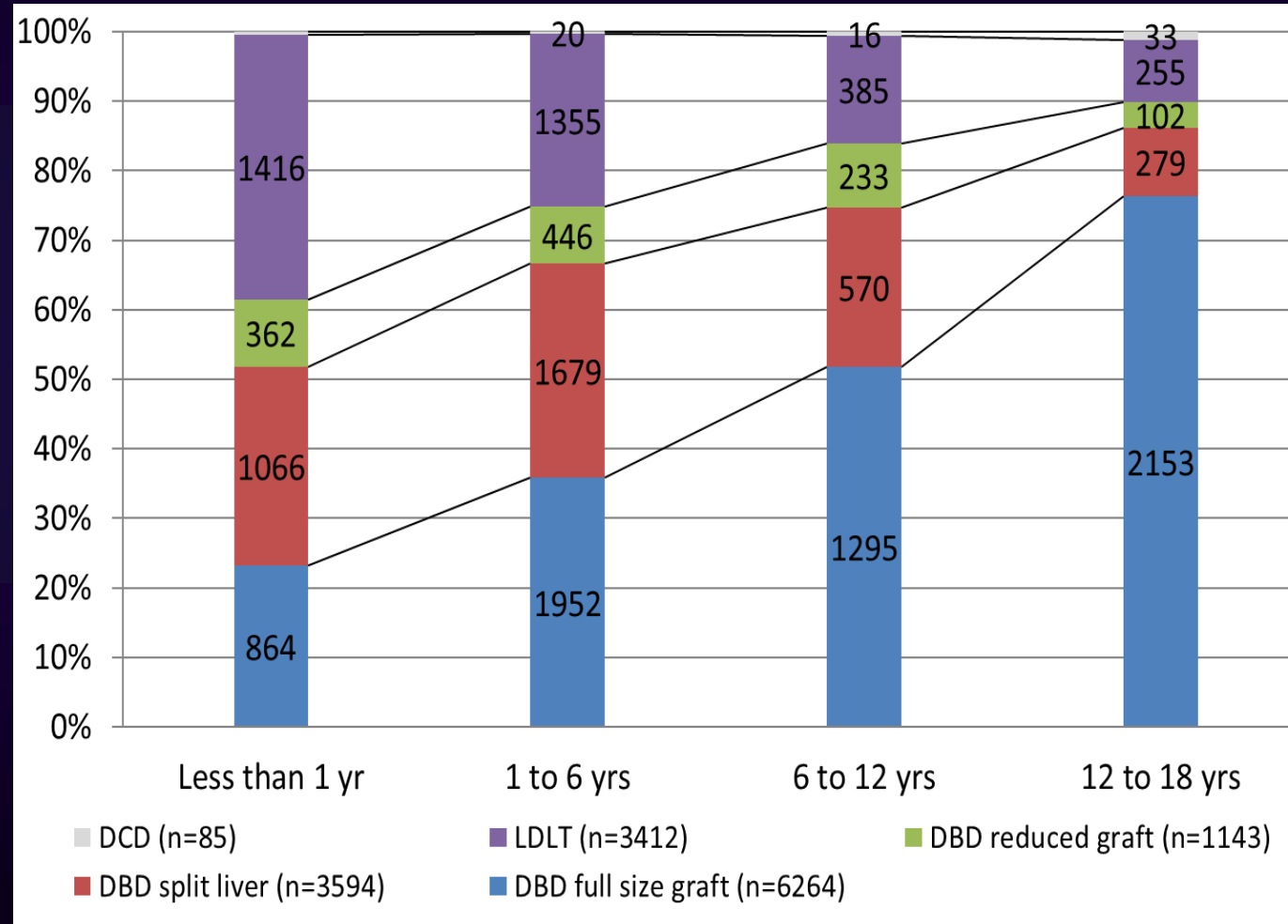
... Kgs

OUTCOME

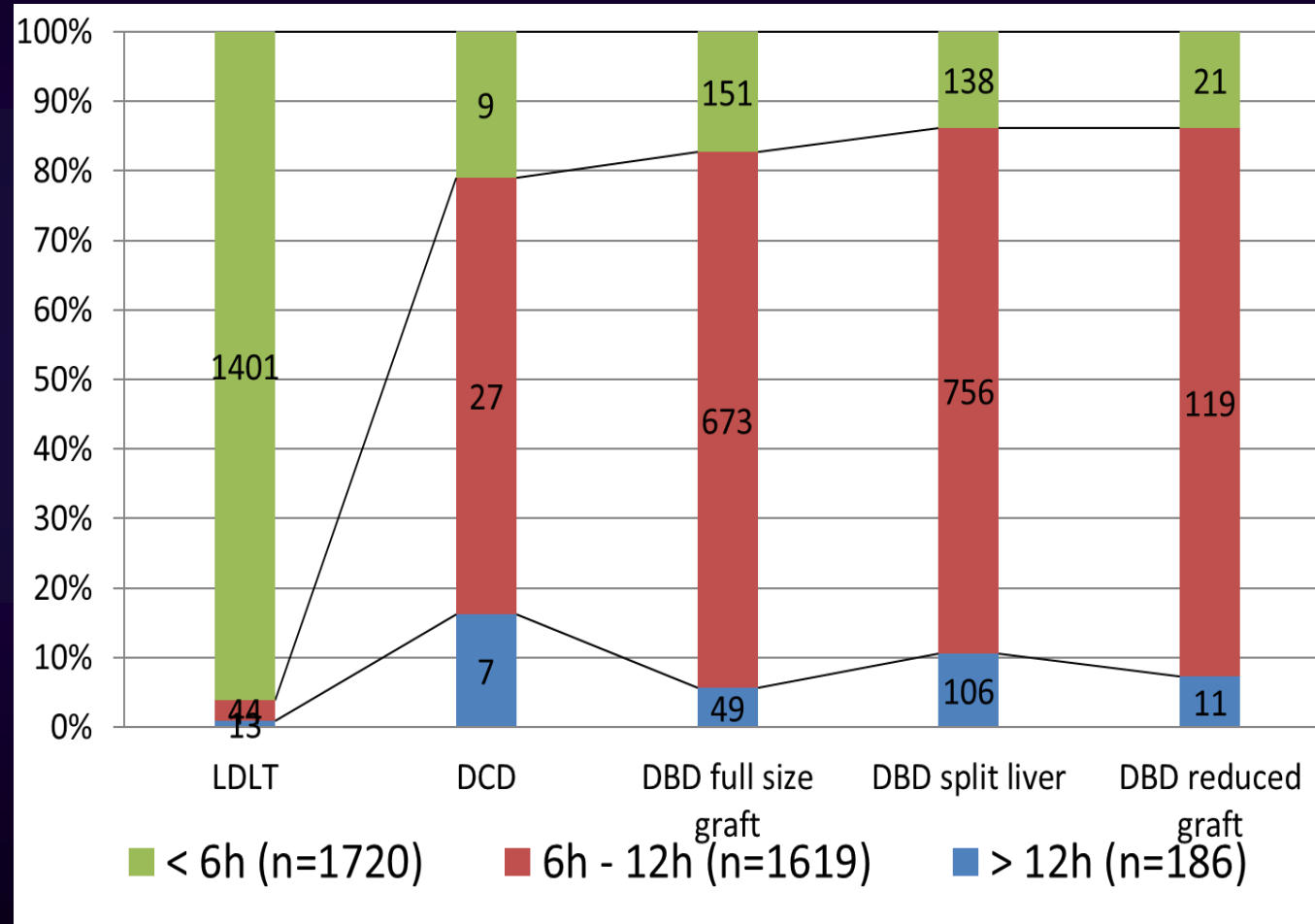
ELTR (2010-2017)

ELTR (2010-2017)

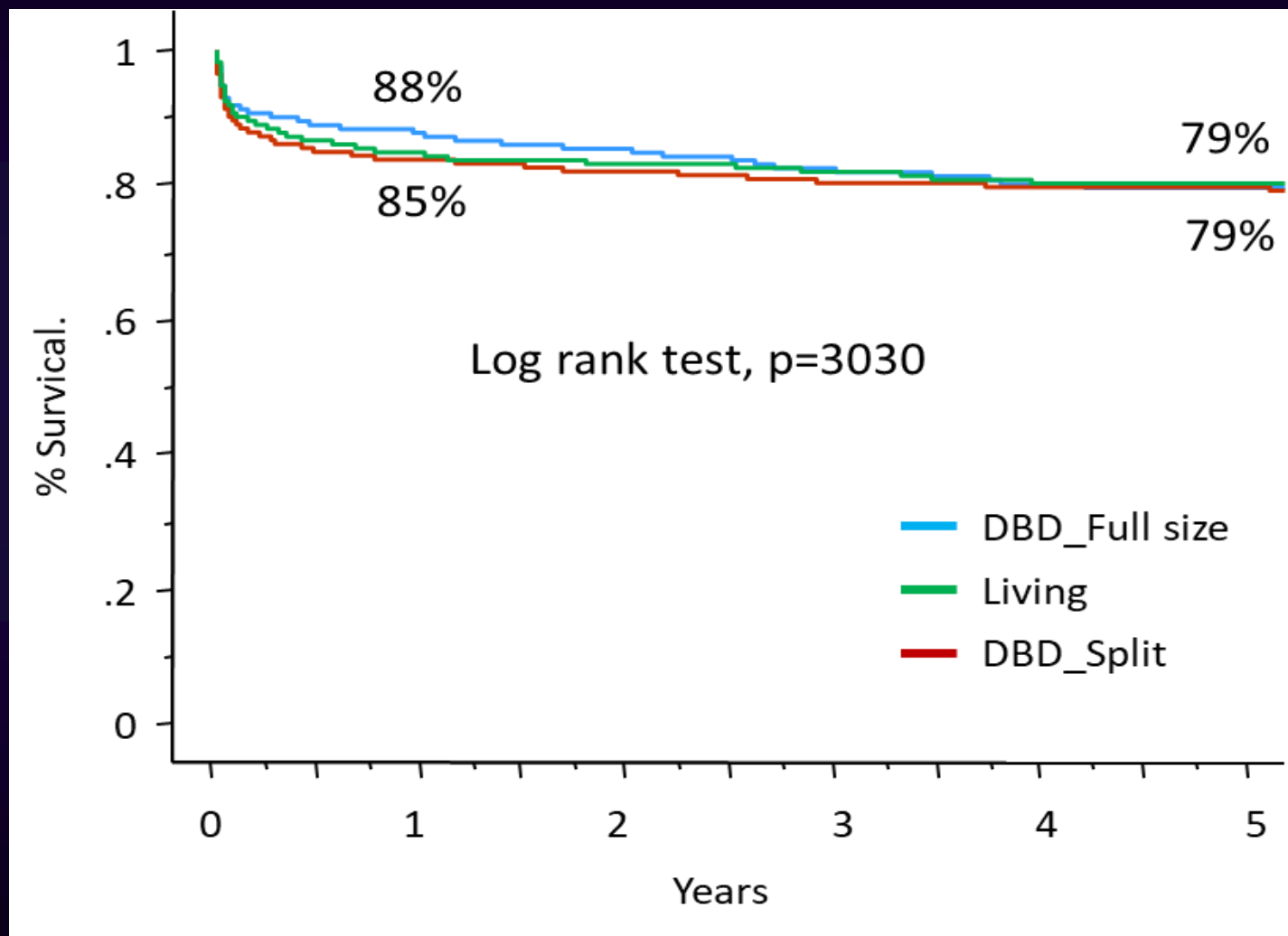
Graft type according to recipient age (2010-2017)



Ischemic time according to graft type, since 2009 .



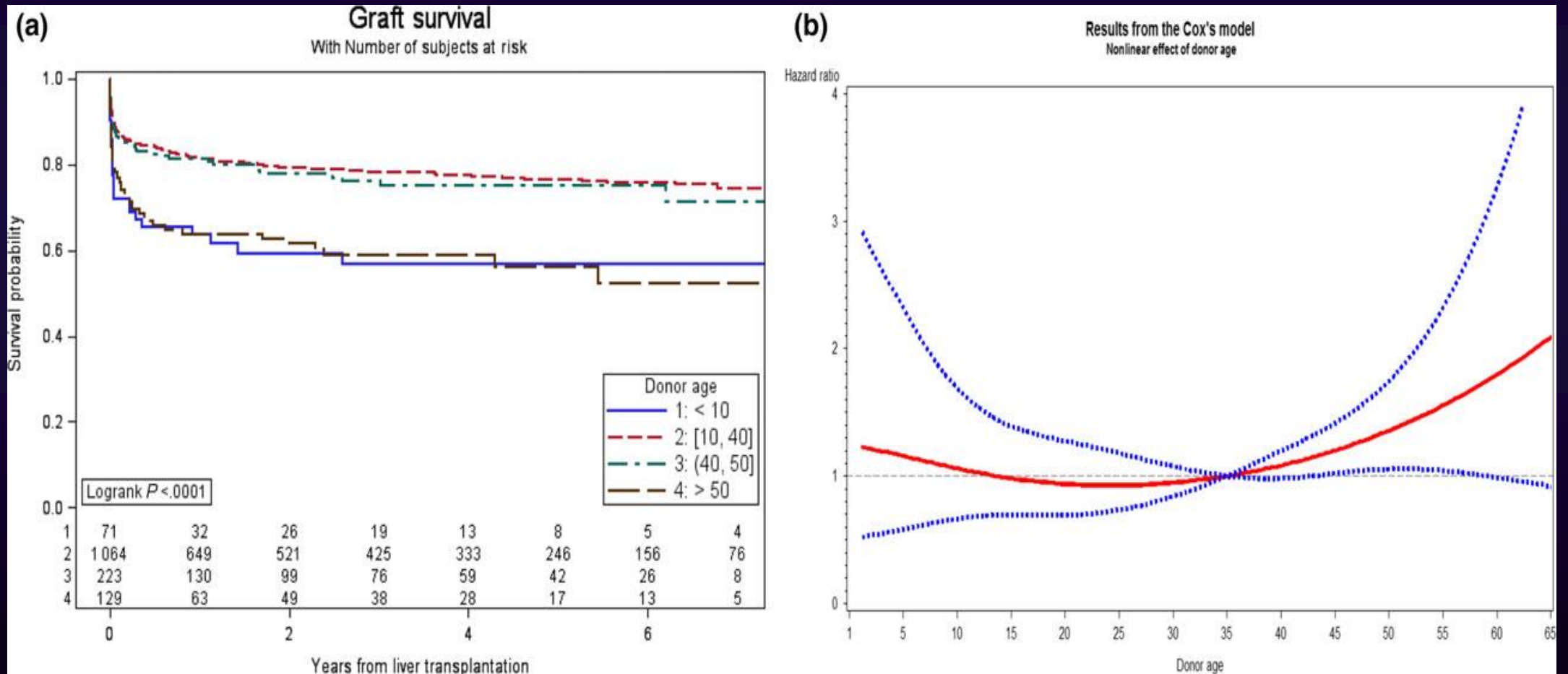
ELTR : Graft survival according to the type of graft since 2010.



DONOR SELECTION

Age and Condition

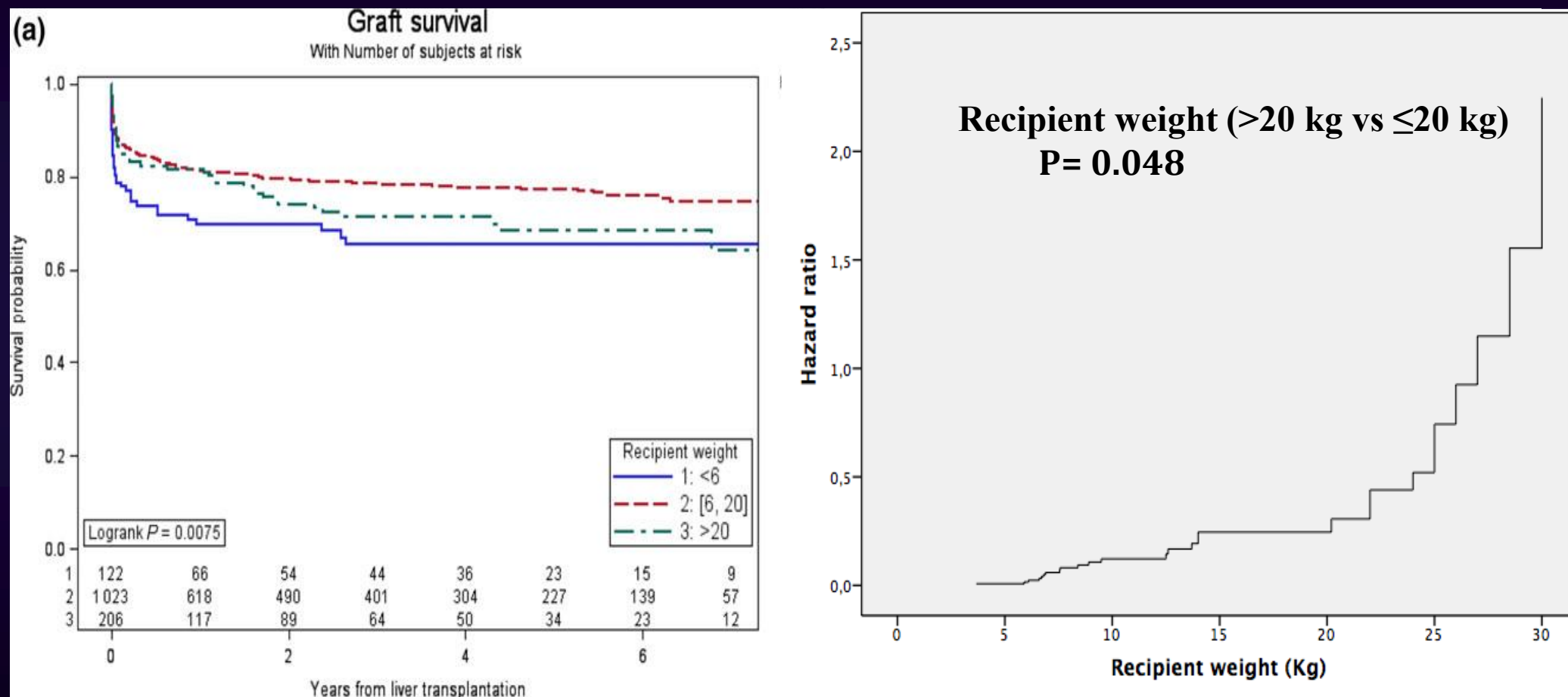
LEFT SPLIT Graft survival according to donor age (1500 split grafts in children / 2006 - 2016)



RECIPIENT SELECTION

Graft weight to recipient weight ratio

Left split graft survival and estimated hazard ratio according to recipient body weight.



*Outcomes of left split graft transplantation in Europe: report from the European Liver Transplant Registry.
Angelico et al. Transplant International 2018*



Right lobe split liver graft versus whole liver transplantation: A systematic review by updated traditional and cumulative meta-analysis.
Gavriilidis P, Roberts KJ, Azoulay D. Dig Liver Dis. 2018

Fourteen studies - 6791 patients

Outcome of interest	Number of studies and patients	P value
Primary non-function	5, 4310	.41
3-Month patient survival	3266	.80
1-Year patient survival	6, 3124	.63
3-Year patient survival	5, 4060	.20
5-Year patient survival	6, 2215	.47
3-Month graft survival	2242	.76
1-Year graft survival	7, 3749	.43
3-Year graft survival	6, 3718	.28
5-Year graft survival	7, 3749	.18

Despite the higher postoperative complication rate in the RLSG cohort compared to the WLT cohort,

patient and graft survival were similar between the two groups.

CONCLUSION

CONCLUSION

In a context of

- **Steadily improving outcomes after liver transplantation**
 - **Growing needs for liver replacement in infants and children**
 - **Decreasing number of pediatric multiorgan donors**
 - **Worsening organ shortage in general**
-
- **Splitting livers is a mandatory solution to maximize the number of liver grafts to allocate to those who need Tx**
-
- **In combination with living donor option, split transplantation offers a solution for transplanting most children in need**

Thank you