

Redefining What is Possible in Transplantation : Current Trends

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Director of Adult and Pediatric Liver and Gastrointestinal Transplantation
Professor of Clinical Surgery
Division of Solid Organ Transplantation
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Active Areas of research and Expansion

Advanced Organ Preservation (normothermic , Subzero, etc)

AI revolution in donor-recipient matching and outcome prediction

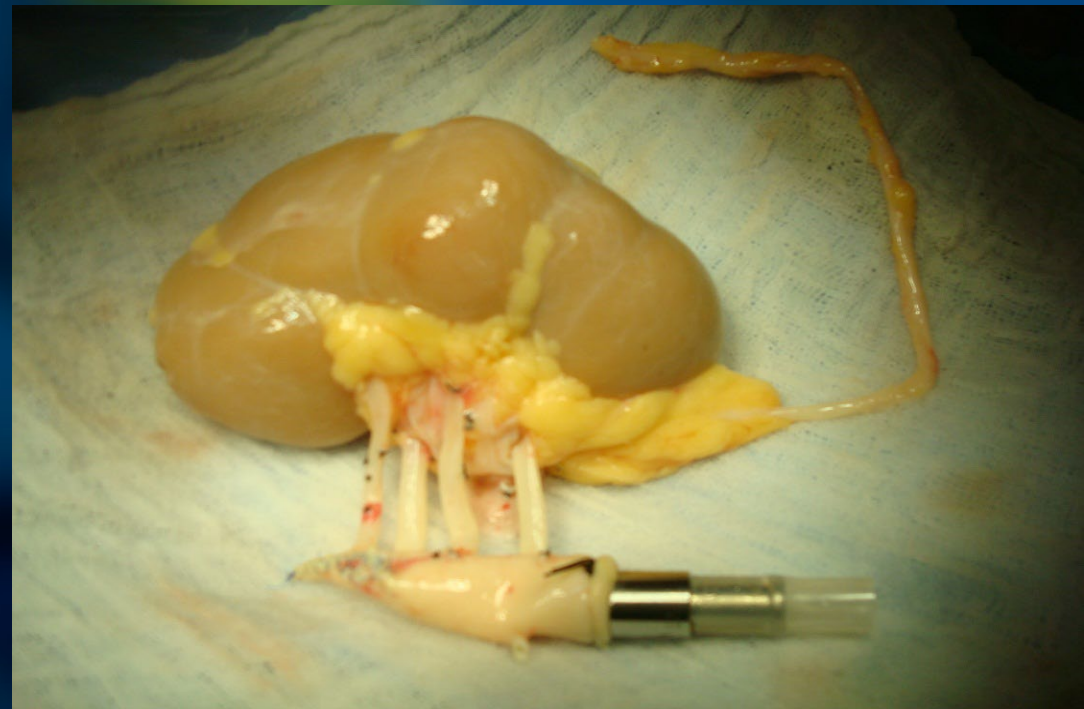
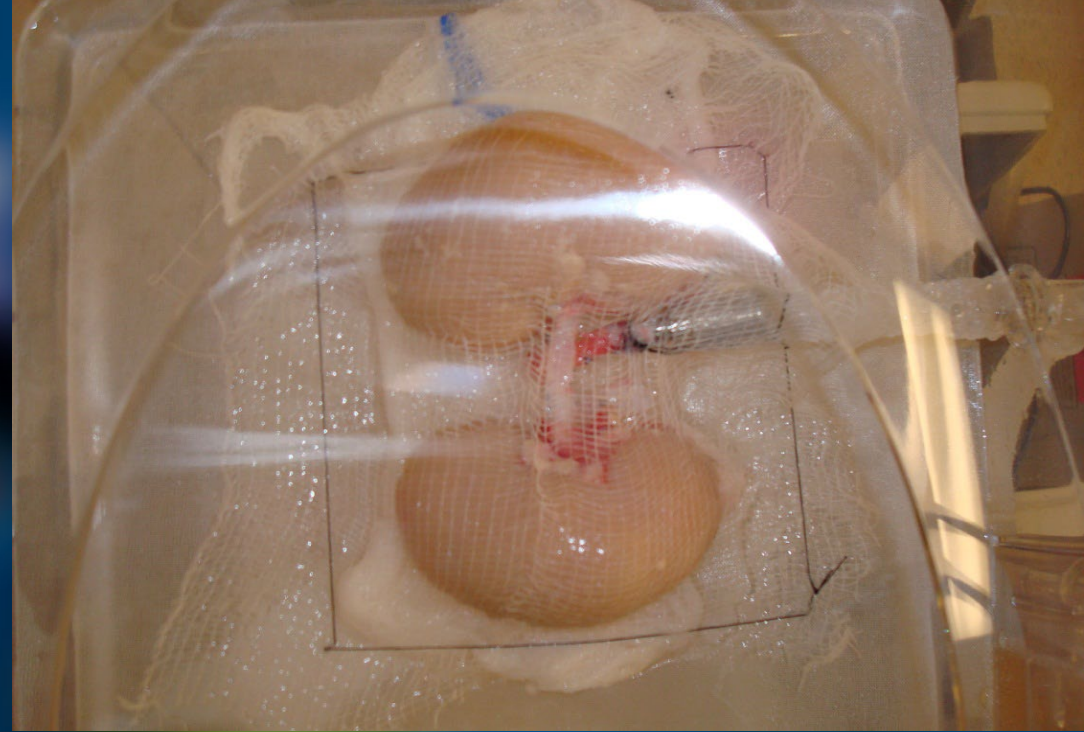
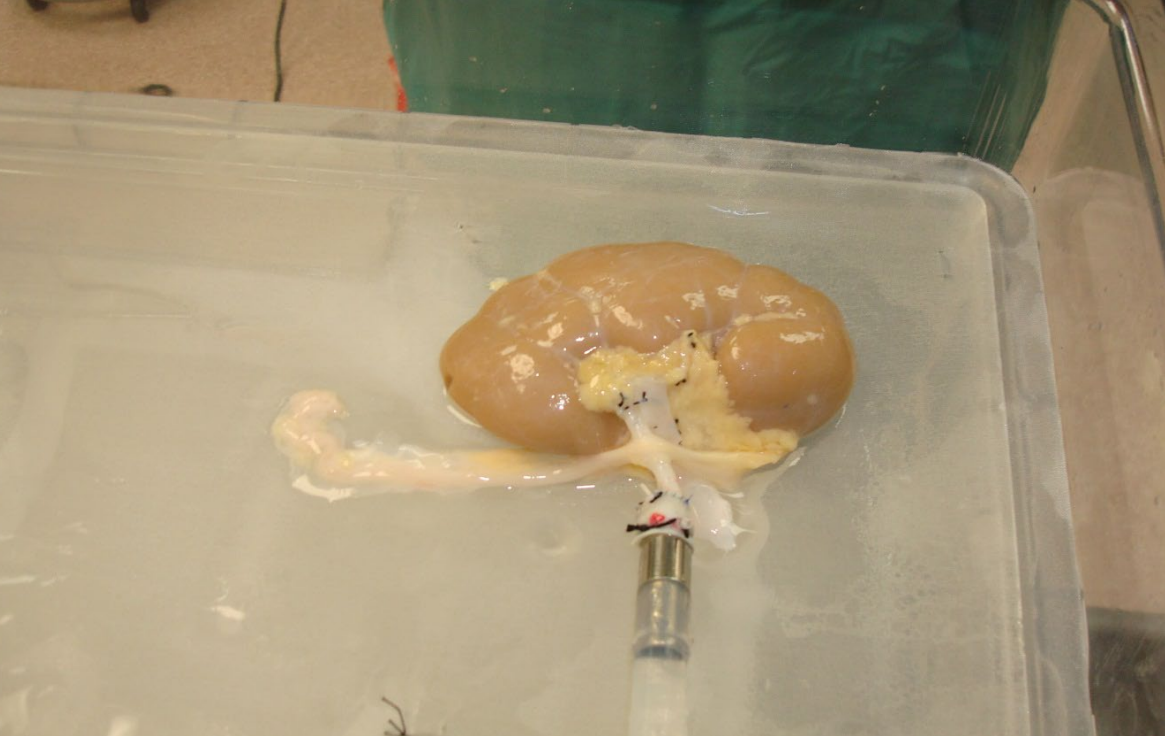
Immune monitoring and strategies to eliminate lifelong immunosuppression

Xenotransplantation

3D printing

A blurred world map with the word "KIDNEY" overlaid in white text. The map shows continents in various colors (green, yellow, red, purple) against a dark blue background. The text is centered horizontally and vertically.

KIDNEY



Machine Perfusion in Kidney Transplantation - Kidney Transporter



Life Port Advantages

1. It can be brought into the donor operating room
2. Kidney pressures, flow rates, and renal resistance are measured and electronically documented (also capable monitoring via internet)
3. It is a single kidney design and can safely shipped via courier or commercial aircraft
4. The battery life is 36 hours and can maintain temperatures of less than 7 degrees for up 48 hours
5. Protect the kidney for air embolism
6. Increase flow rates while keeping pressures constant

Solutions Use for The Machine Perfusion

1. Belzer MPS – UW Machine Perfusion Solution
2. KPS-1 UW Machine perfusion Solution

National and MTI Wait List Offer Acceptance

Figure B7. Offer acceptance: Overall

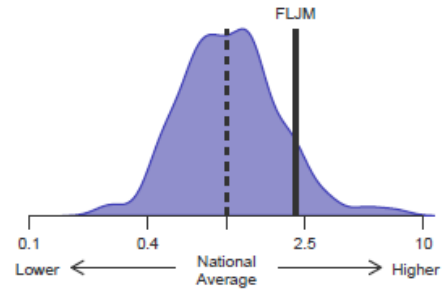


Figure B8. Offer acceptance: Low-KDRI

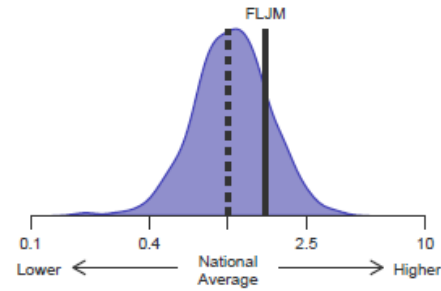


Figure B9. Offer acceptance: Medium-KDRI

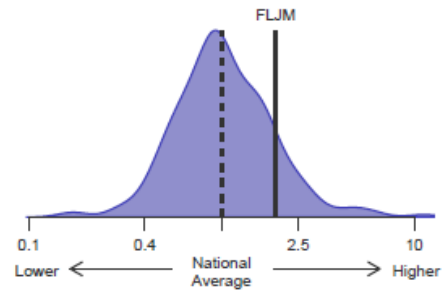


Figure B10. Offer acceptance: High-KDRI

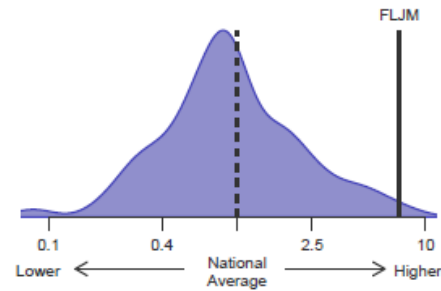
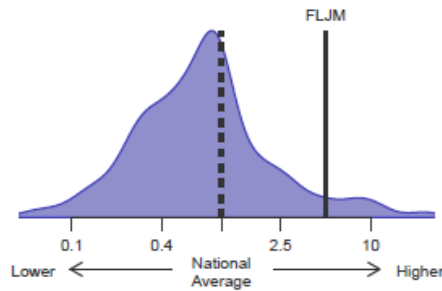


Figure B11. Offer acceptance: Offer number > 100

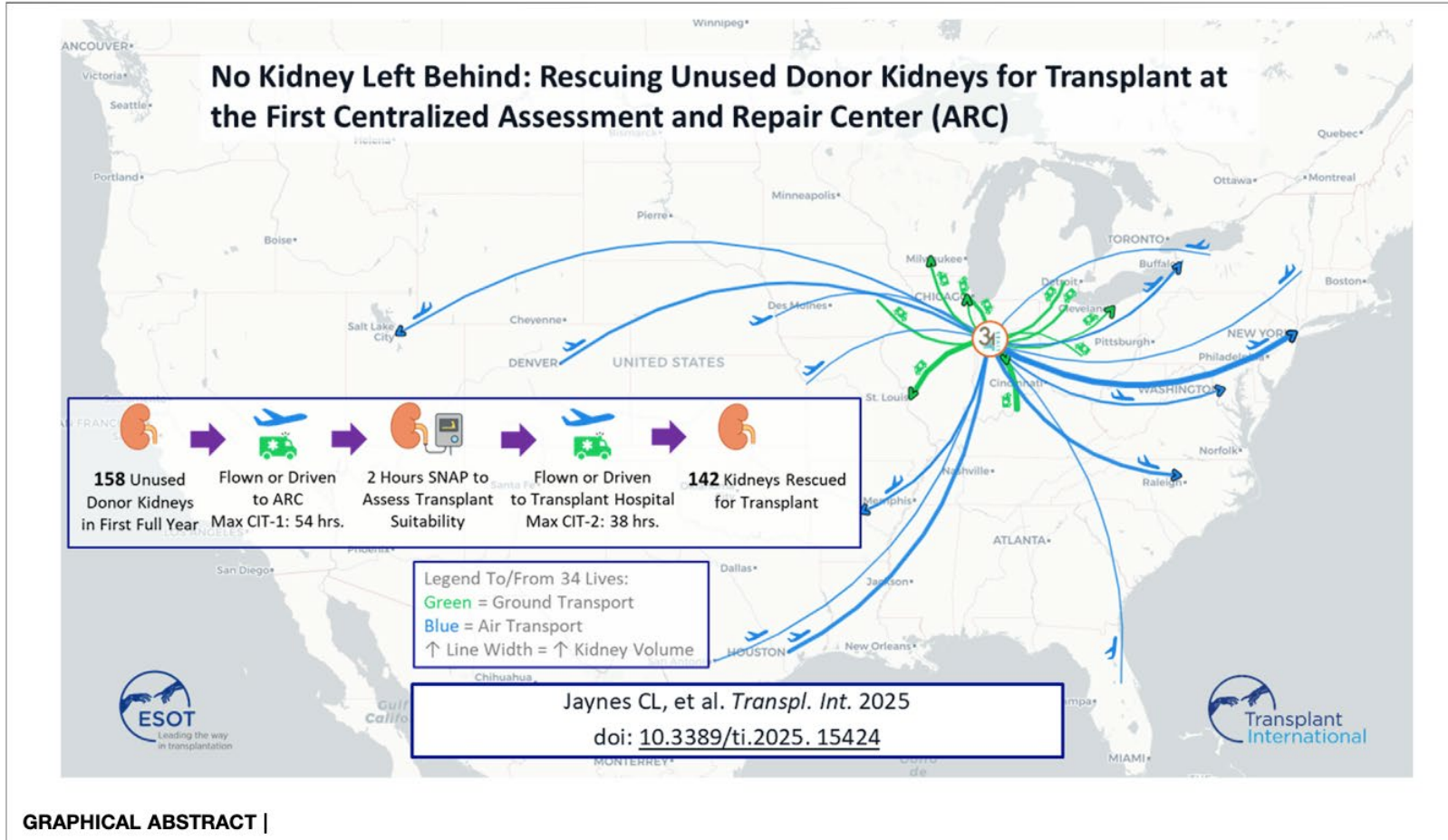




No Kidney Left Behind: Rescuing Unused Donor Kidneys for Transplant at the First Centralized Assessment and Repair Center

Christopher L. Jaynes^{1,2†}, William C. Goggins^{3†}, Matthew L. Holzner^{4†},
Jacqueline Garonzik-Wang^{5†} and Henri G. D. Leuvenink^{1,2†}*

¹Department of Surgery-Organ Donation and Transplantation, University Medical Center Groningen, Groningen, Netherlands, ²34 Lives, Public Benefit Company, West Lafayette, IN, United States, ³Division of Transplant Surgery, Department of Surgery, Indiana University School of Medicine, Indianapolis, IN, United States, ⁴Recanti/Miller Transplantation Institute, Icahn School of Medicine at Mount Sinai, New York, NY, United States, ⁵University of Wisconsin Department of Surgery, Madison, WI, United States



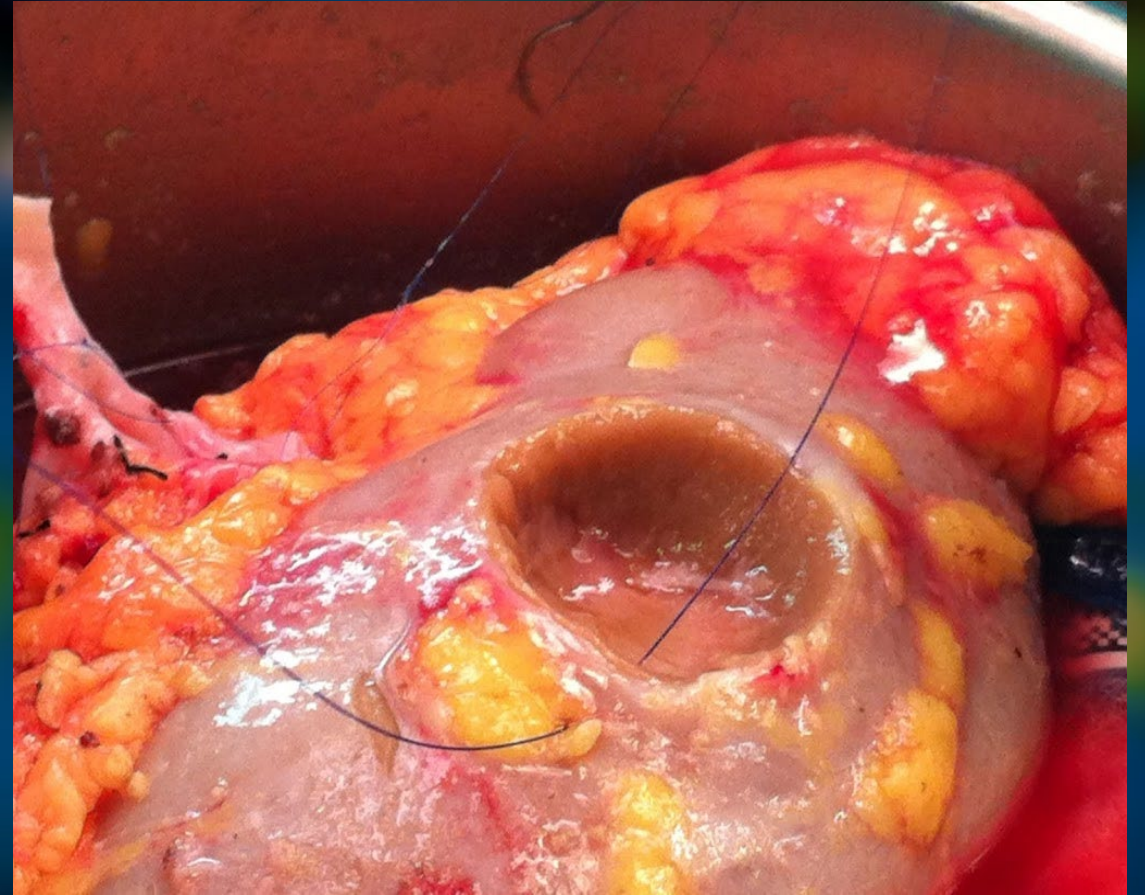
GRAPHICAL ABSTRACT |

Use of Kidneys with Small Renal Tumors for Transplantation

Alejandro Lugo-Baruqui¹ · Giselle Guerra² · Adriana Arocha¹ · George W. Burke¹ · Gaetano Ciancio¹



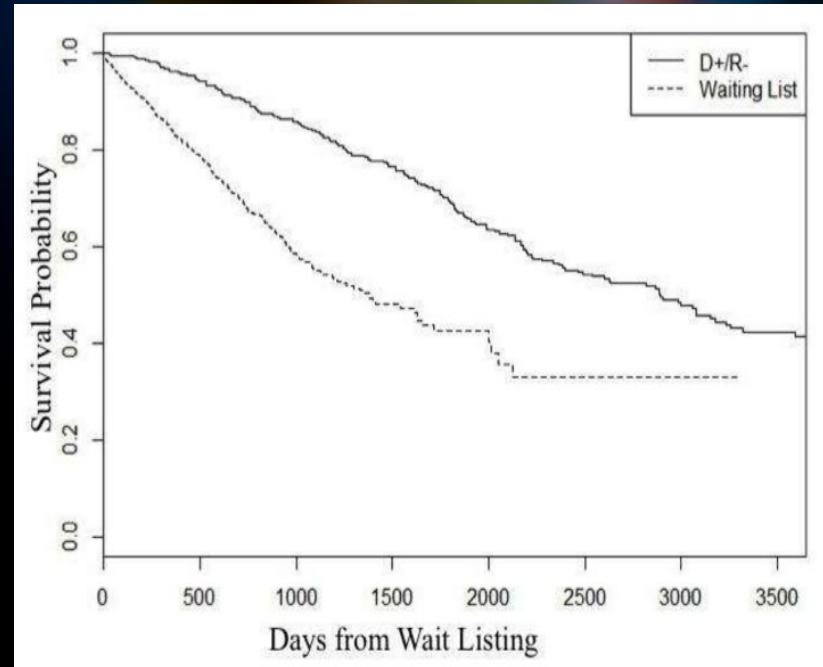
Fig. 1 Backtable preparation of kidney graft. Backtable preparation of kidney graft with identification of the tumor (a) partial nephrectomy with appropriate surgical margins (b) final repair of the graft before transplantation (c)



HCV+ Donors for HCV- Recipients

Recipients will all acquire HCV+ status

Direct Acting Antivirals (DAA) started as soon as possible posttransplant



Patient survival is superior when compared to n dialysis therapy

Paired Exchange at the MTI

Impact of Compatible Pairs

90% of compatible pairs have consented by the end of the one day work-up evaluation;

23% of the pool increased by adding compatible pairs into the match grid;

46% of recipients actually proceeded to surgery after finding a better match through KPD;

25% of compatible pairs enrolled remained in the match grid for 6-8 weeks but were then pulled out to proceed to surgery (lack of finding a better match)

Entering Compatible Pairs helped to increase chances of finding matches for sensitized and incompatible donors by 35%

Advantages of KPD

Living donor transplants

Better graft survival

Less Delayed Graft Function

Recipients may wait less time for a transplant

Less time on dialysis

More pre-emptive transplants

It can be more rewarding for the donor if he/she knows more patients were transplanted



But there is H.O.P.E. for HIV Patients



HIV Organ Policy Equity Act Signed February 14, 2013

Authorizes clinical research and the revision of rules about organ donation and transportation as a result of the research. Organs from HIV donors would only be going to individuals who are already HIV positive (could lead to 600 additional organ transplants a year)

U.S. performs world's first organ transplants from living donors who have HIV

This is the world's first kidney transplant from a living donor with HIV, a milestone for patients with the AIDS virus who need a new organ.





Liver Transplantation

Trends in Preservation

Hypothermic Machine Perfusion (0-12C)

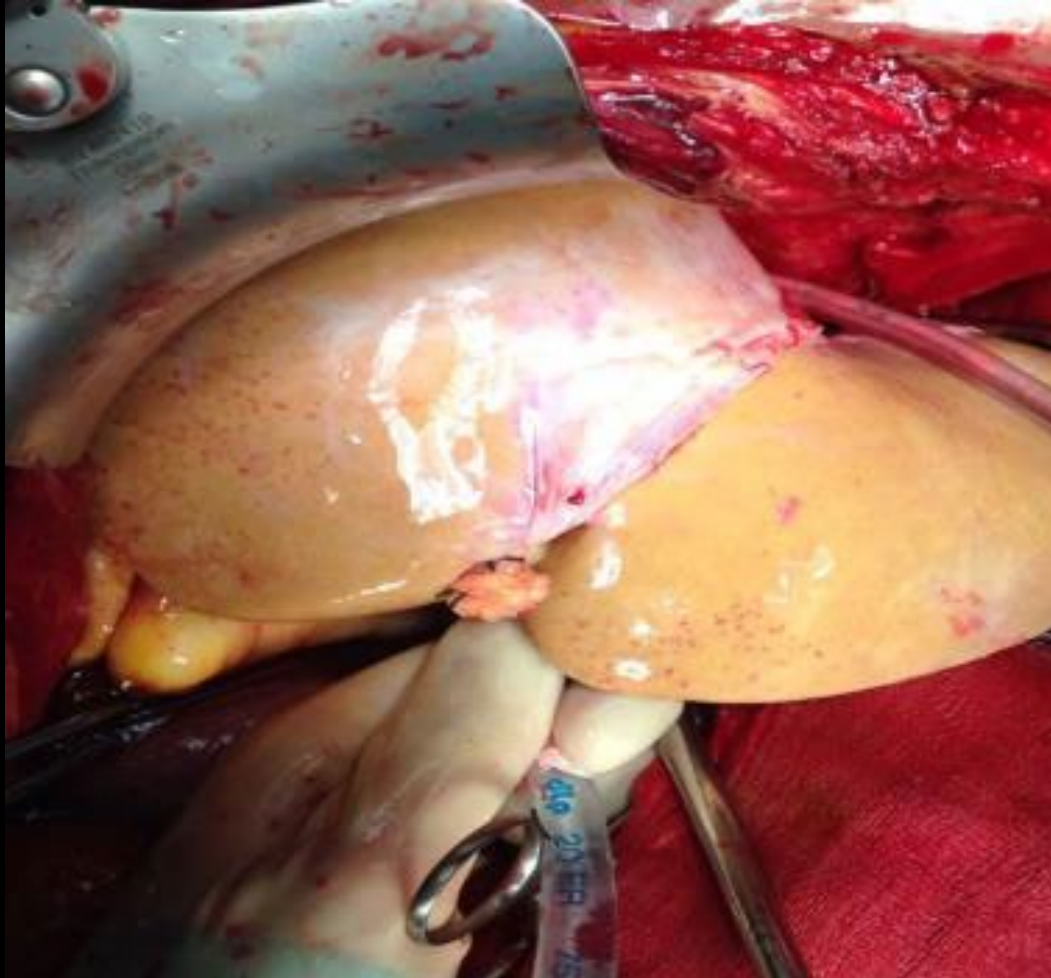
Midthermic Machine Perfusion (13-24C)

Subnormothermic Machine Perfusion (25-34C)

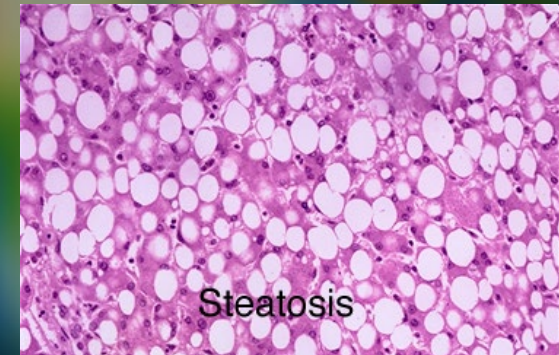
Normothermic Machine Perfusion (35-38C)



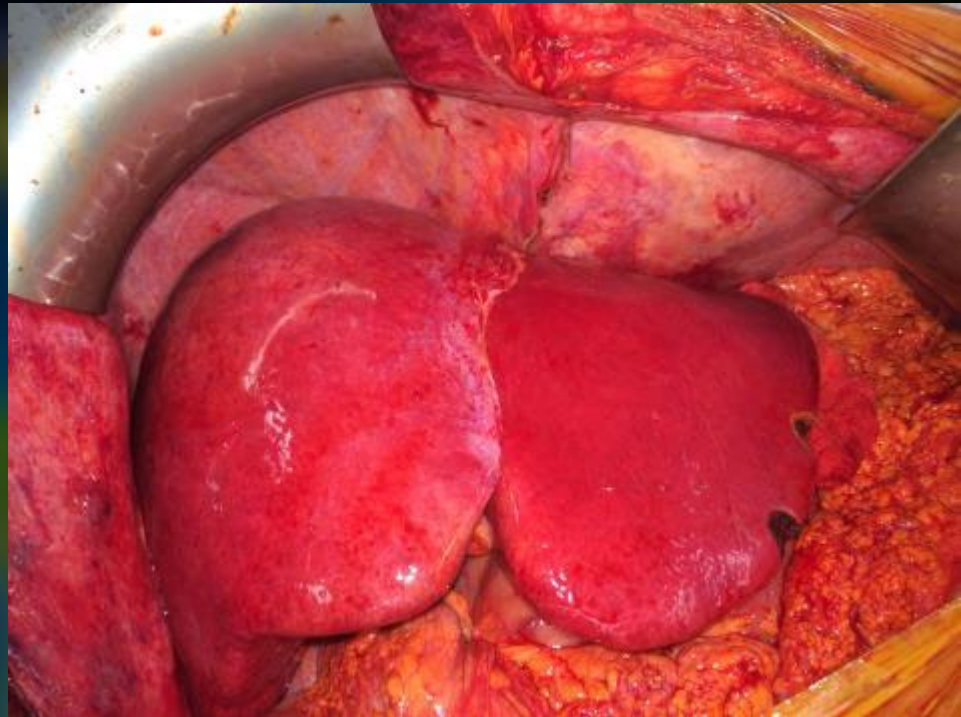
Steatosis



60% Macro and 20% Micro



Steatosis



Ex-situ Normothermic Perfusion

Extension of preservation time

Possible prediction of initial function and post transplant outcomes

Possibility of not only preserving but also to offer intervention prior to transplantation (stem cells , genetic therapies , combination of methods)

Surgery



› [Ann Surg.](#) 2020 Jan 14. doi: [10.1097/SLA.00000000000003721](#). Online ahead of print.

En-Bloc Simultaneous Heart-Liver Transplantation in Adult Patients

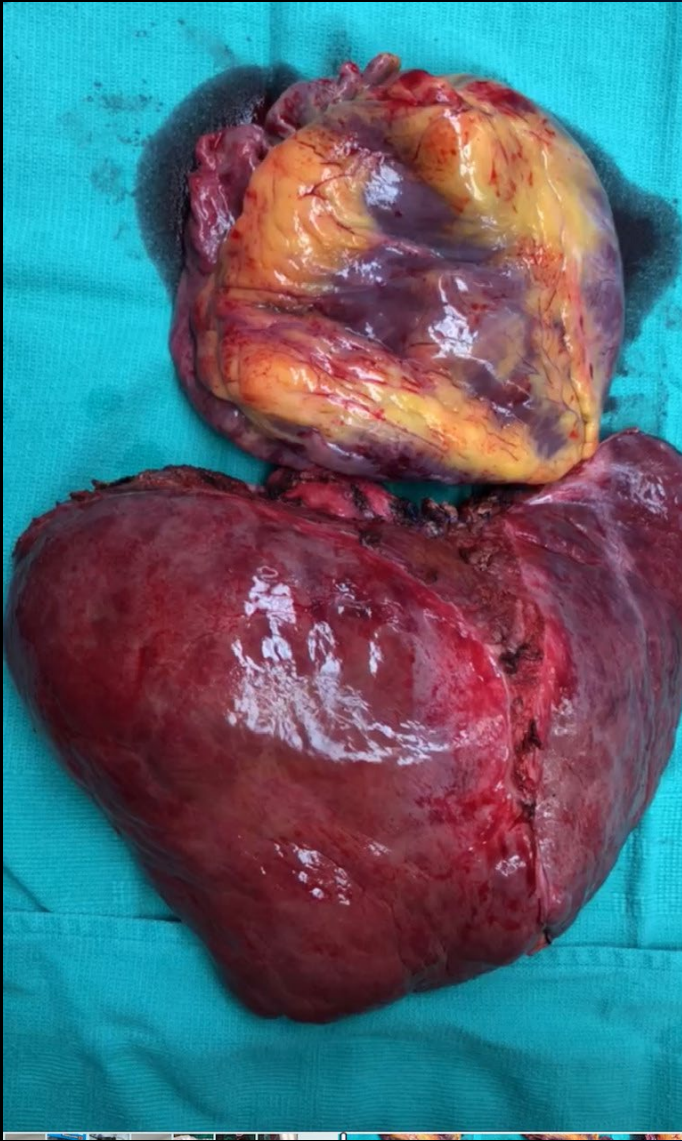
Nicolas A Brozzi ¹, Matthias Loebe ¹, Fouad Ghazi Souki ², Thiago Beduschi ³, Ali Ghodzisad ¹, Akin Tekin ³, Astrid Nicolau-Raducu ², Rodrigo M Vianna ³

Affiliations + expand

PMID: 31939750 DOI: [10.1097/SLA.00000000000003721](#)

Abstract

Introduction: Complexity of combined heart-liver transplantation has resulted in low adoption rates. We report a case series of adult patients receiving en-bloc heart-liver transplantation (HLT_x), describe technical aspects, and discuss benefits of the technique.



Post-Discharge Outcomes

All 4 patients discharged from hospital were alive at follow-up of 570 days (range of 374–990 days), accounting for a 1-year survival of 100% after en-bloc HLTx.

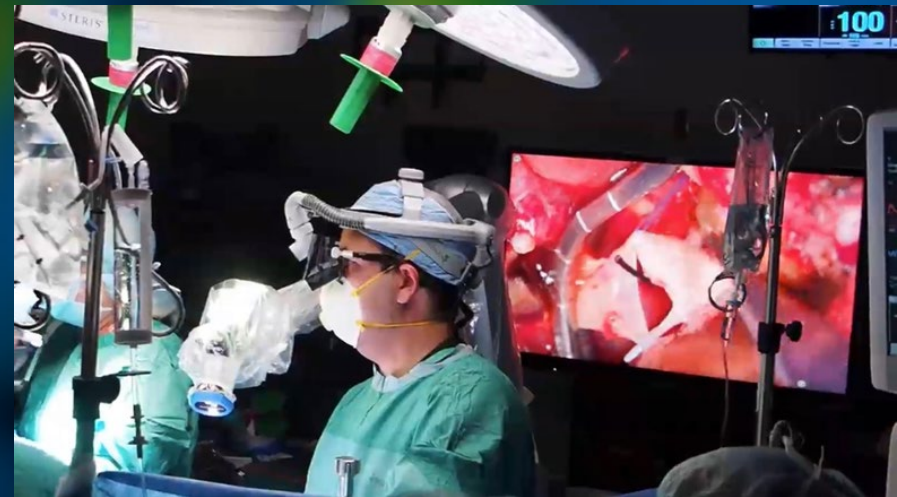
None of the patients presented cardiac graft rejection (grade 2R) on 30 heart biopsies performed during follow up, and there was no evidence of liver allograft dysfunction or development of ischemic cholangitis on follow-up to 1-year post “en-bloc” HLTx.

ORBEYE Video Microscope Ex



First adult and first pediatric liver transplant performed in the world using ORBEYE

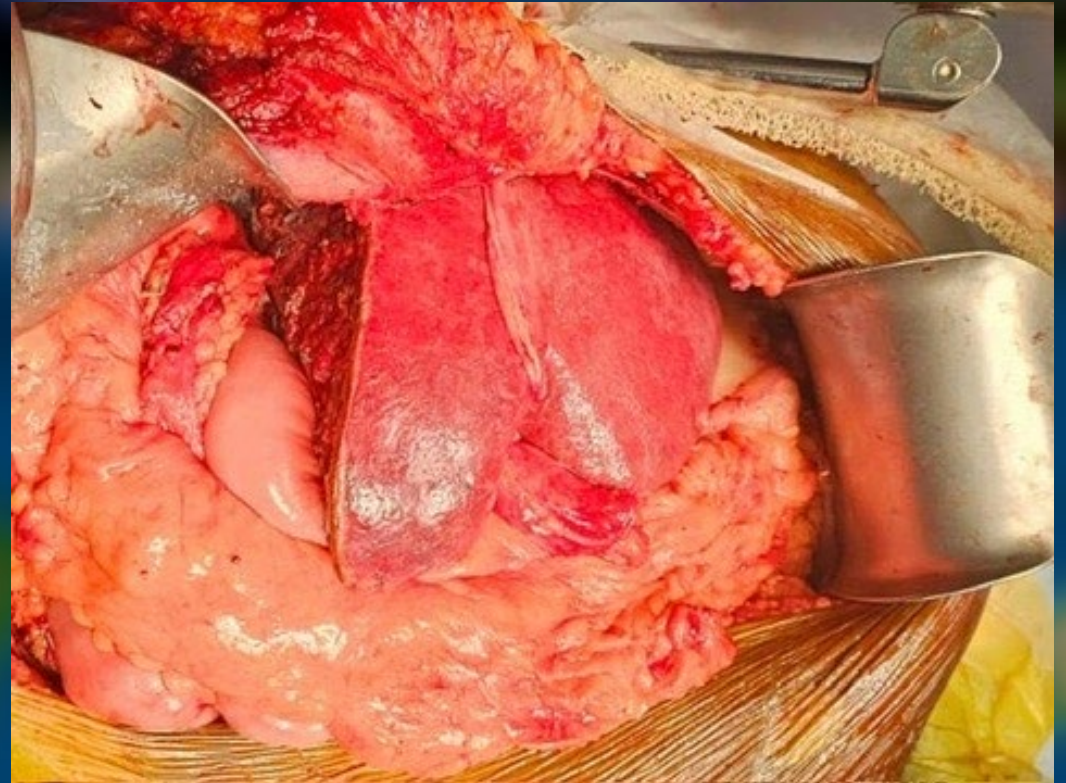
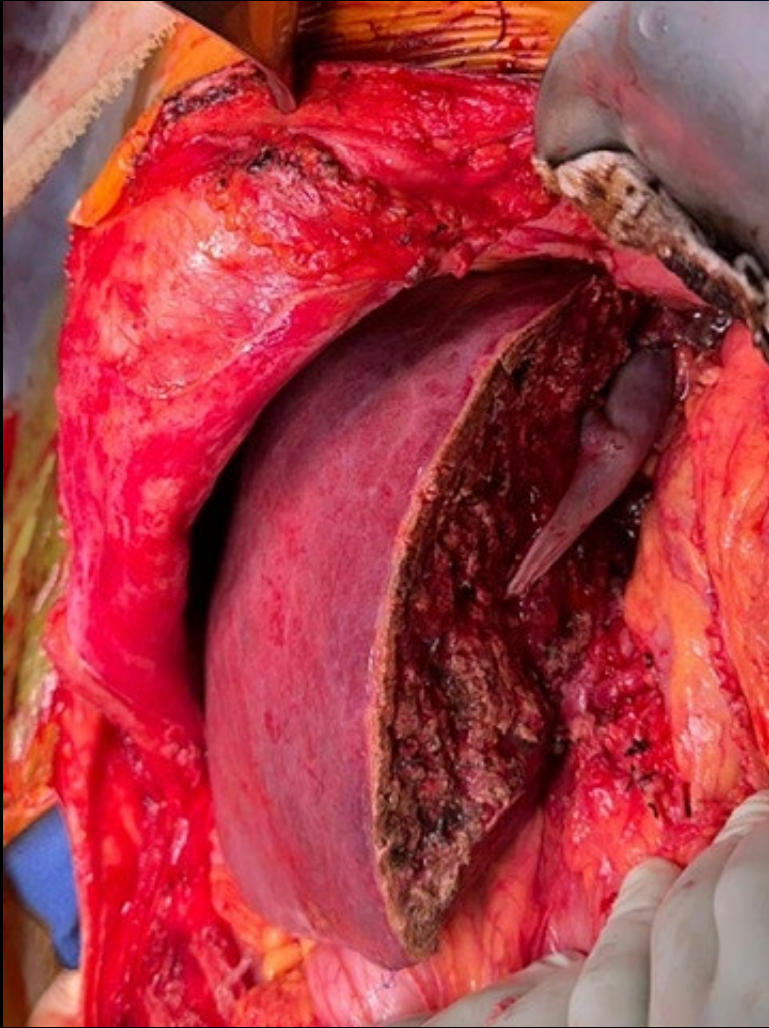
Magnifies x 26. Loops x 6.
Liver transplant on 4KG baby using left lateral lobe from a 2 year old donor





Splits for adults





A blurred world map with the word "Monitoring" overlaid in white text. The map shows continents in various colors (green, yellow, red, purple) against a dark blue background. The text is centered horizontally and vertically.

Monitoring

Cell free DNA

Several studies analyzing whether dd-cfDNA can be used to identify early signs of rejection, allowing physicians to optimize immunosuppressant levels with minimal risk of rejection.

REVIEWS

Donor-specific Cell-free DNA as a Biomarker Solid Organ Transplantation. A Systematic Review

Knight, Simon Robert MChir^{1,2}; Thorne, Adam BSc¹; Lo Faro, Maria Letizia PhD¹

[Author Information](#) 

Transplantation: February 2019 - Volume 103 - Issue 2 - p 273-283

doi: 10.1097/TP.0000000000002482

Rejection Kinetics

- We want to understand the kinetics of rejection using both dd-cfDNA and other markers.
- How quickly does the dd-cfDNA rise?
- How does this differ with different rejection types?
- Is dd-cfDNA able to detect rejection earlier than serum creatinine/LFTS?



Ultracomplex Procedures Transplantation & oncology

Ex Vivo Resection and Autotransplantation for Conventionally Unresectable Tumors – An 11-year Single Center Experience

Tomoaki Kato, MD, MBA,✉ Regina Hwang, MD,* Peter Liou, MD,* Joshua Weiner, MD,* Adam Griesemer, MD,* Benjamin Samstein, MD,† Karim Halazun, MD,† Abhishek Mathur, MD,* Gary Schwartz, MD,* Daniel Cherqui, MD,‡ and Jean Emond, MD**

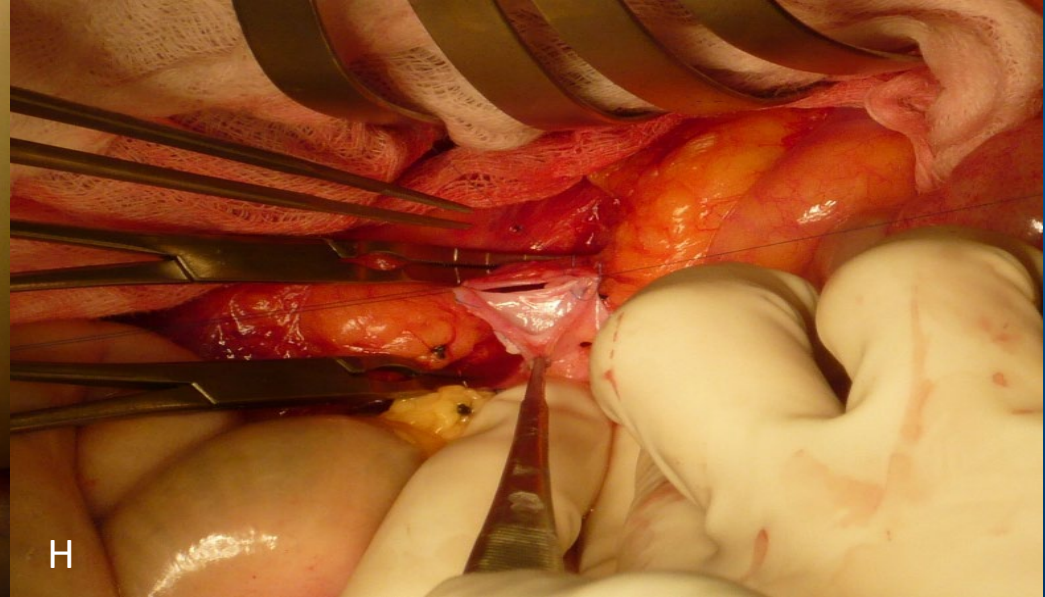
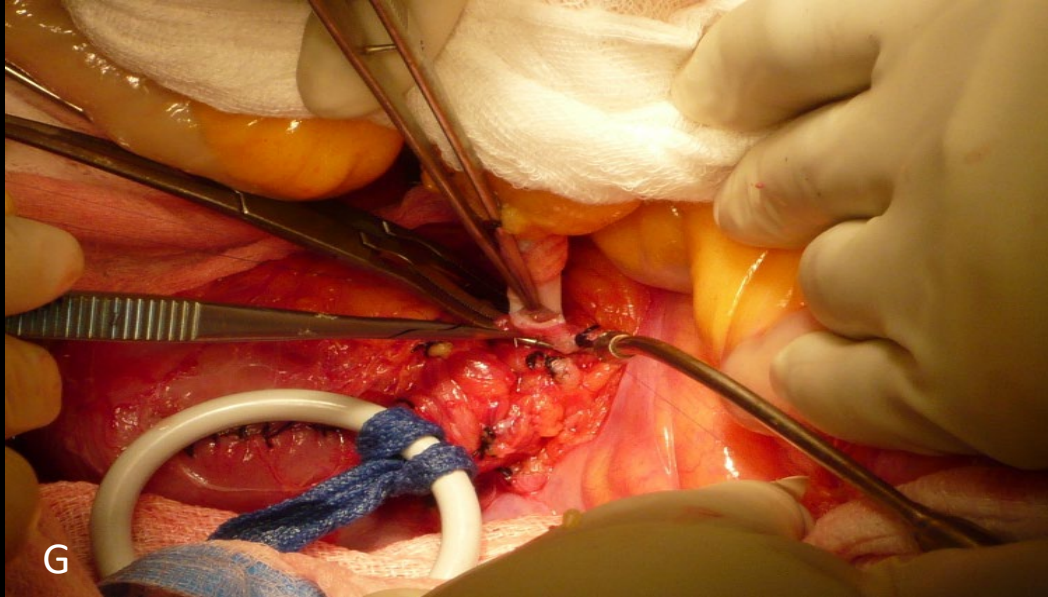
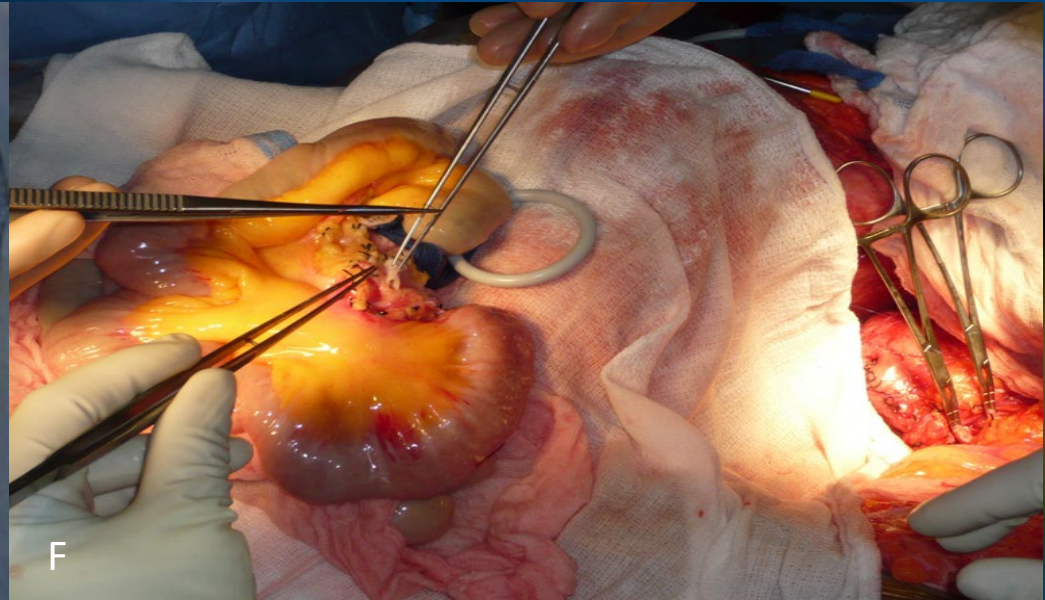
Background and Aims: Ex vivo surgery may provide a chance at R0 resection for conventionally unresectable tumors. However, long-term outcomes have not been well documented. In this study, we analyze our 11-year outcomes to define its role.

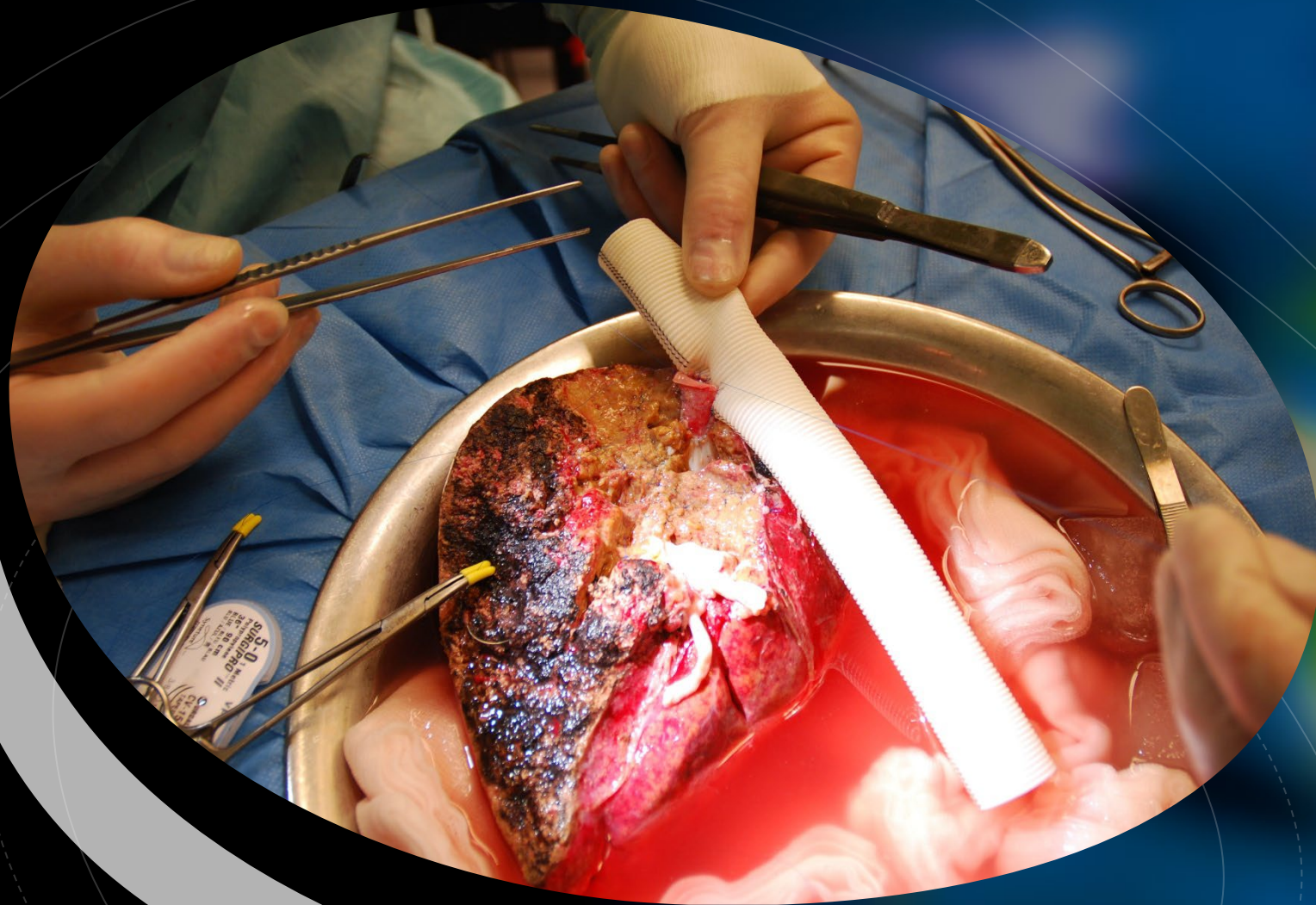
Study Design: We retrospectively analyzed 46 consecutive patients who underwent ex vivo surgery at our institution 2008–2019.

Results: The types of tumors were: carcinoma (n = 20), sarcoma (n = 20) and benign to low grade tumor (n = 6). The type of ex vivo surgery was chosen based on tumor location and vascular involvement. The most commonly performed procedure was ex vivo hepatectomy (n = 18), followed by ex vivo resection and intestinal autotransplantation (n = 12), ex vivo Whipple procedure and liver autotransplantation (n = 8) and multivisceral ex vivo procedure (n = 7). Twenty-three patients (50%) are currently alive with median follow-up of 4.0-years (11 months–11.8 years). The overall survival was 70%/59%/52%, at 1-/3-/5-years, respectively. Patient survival for benign to low grade tumors, sarcoma, and carcinoma was 100%/100%/100%, 65%/

autotransplantation may overcome these barriers. In this surgical technique, the tumor and organs are temporary removed en bloc and bathed in cold preservation solution to allow locally advanced and anatomically complex tumors to be resected in a bloodless field. The major blood vessels are then reconstructed, and the unaffected organ(s) are re-implanted. This novel technique enables surgeons to perform R0 resection of conventionally inoperable tumors while providing optimal organ preservation. However, use of ex vivo surgery has not been widely adopted due to technical complexities and limited data on its long-term survival.⁹ We began using ex vivo resection and autotransplantation in 2008 and have applied it to 46 cases with various indications and circumstances. Our novel surgical techniques have been described extensively elsewhere.^{10–14} Herein we report our long-term outcomes from our 11-year experience.

STUDY DESIGN

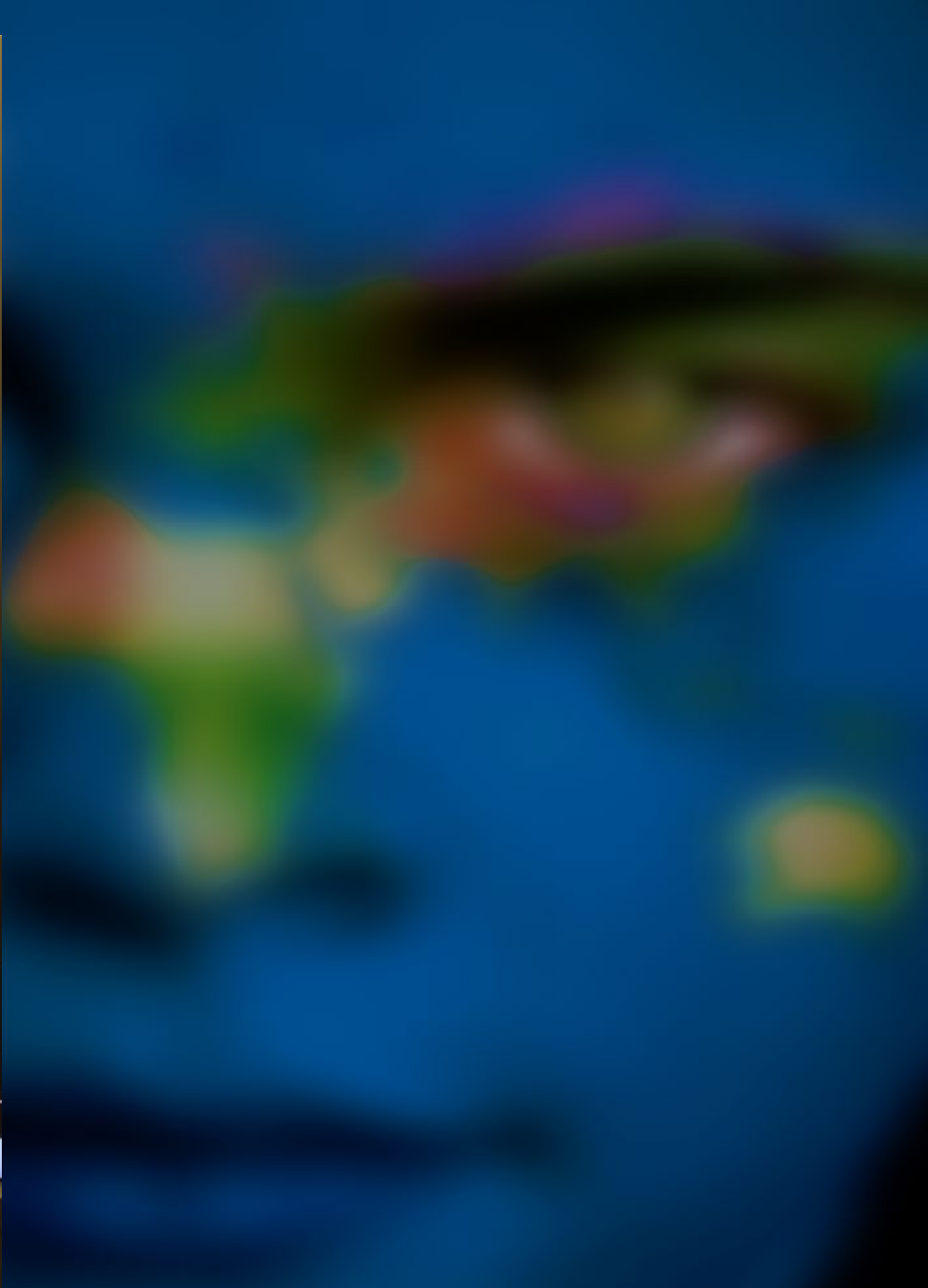


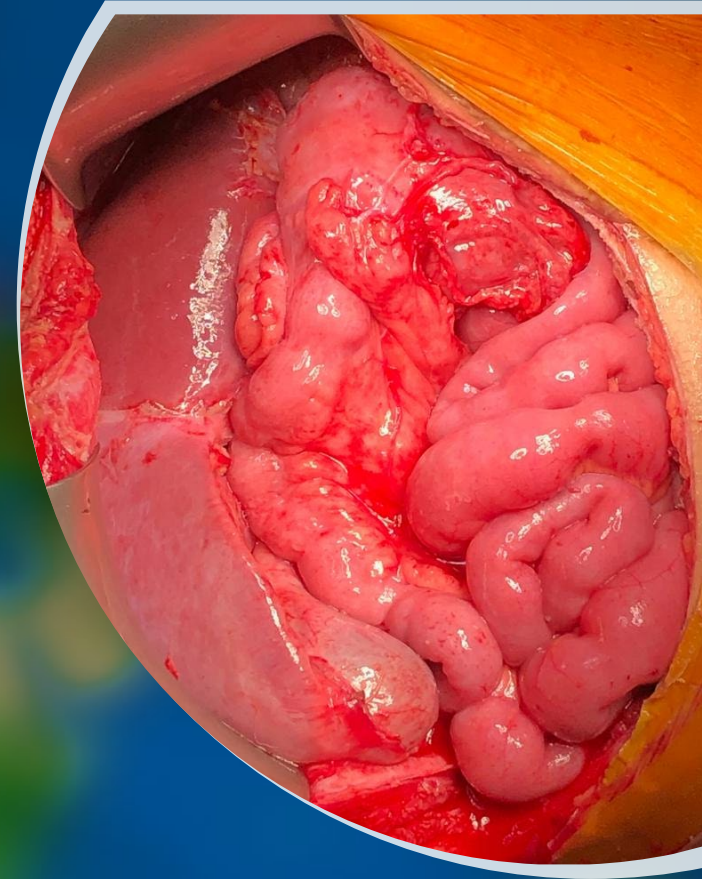
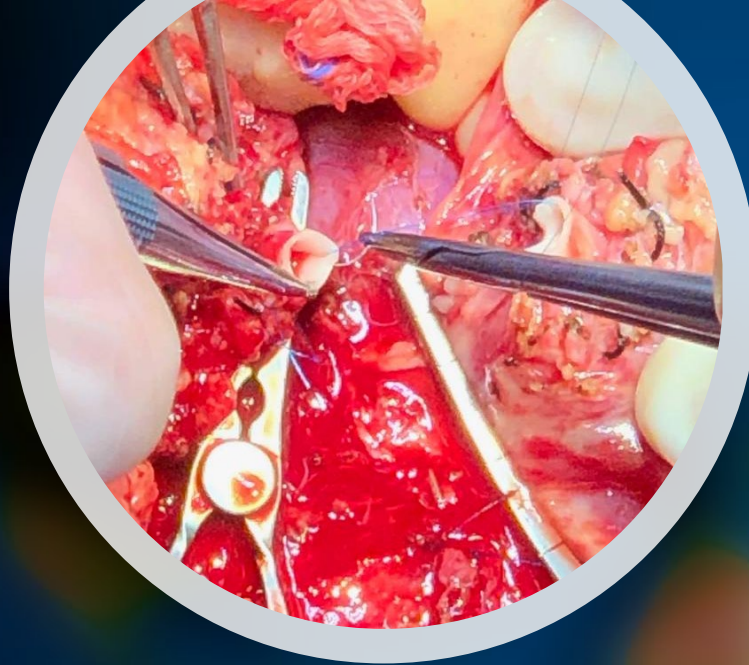
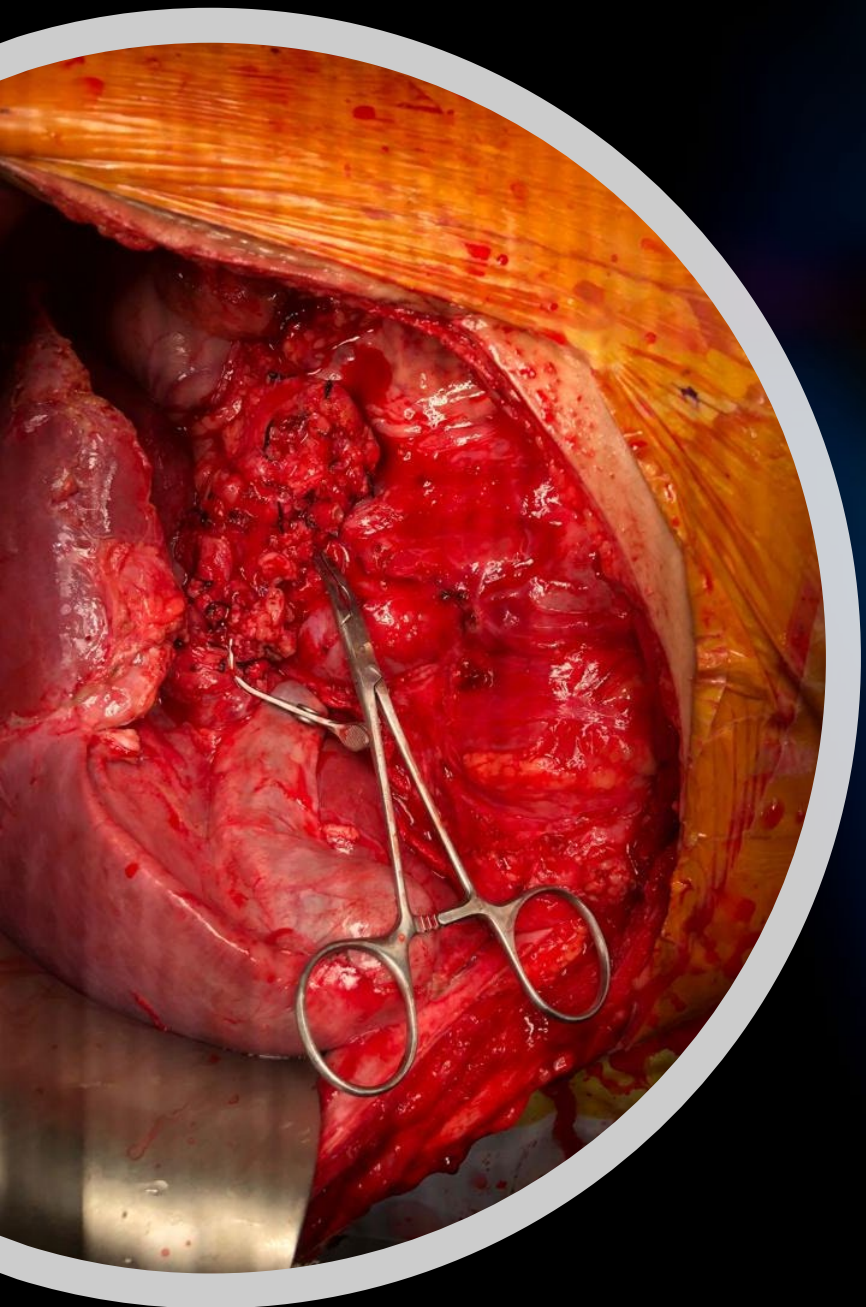


Pic: Courtesy Pal Dag-
Line

Oslo

Rodrigo Vianna, MD, PhD



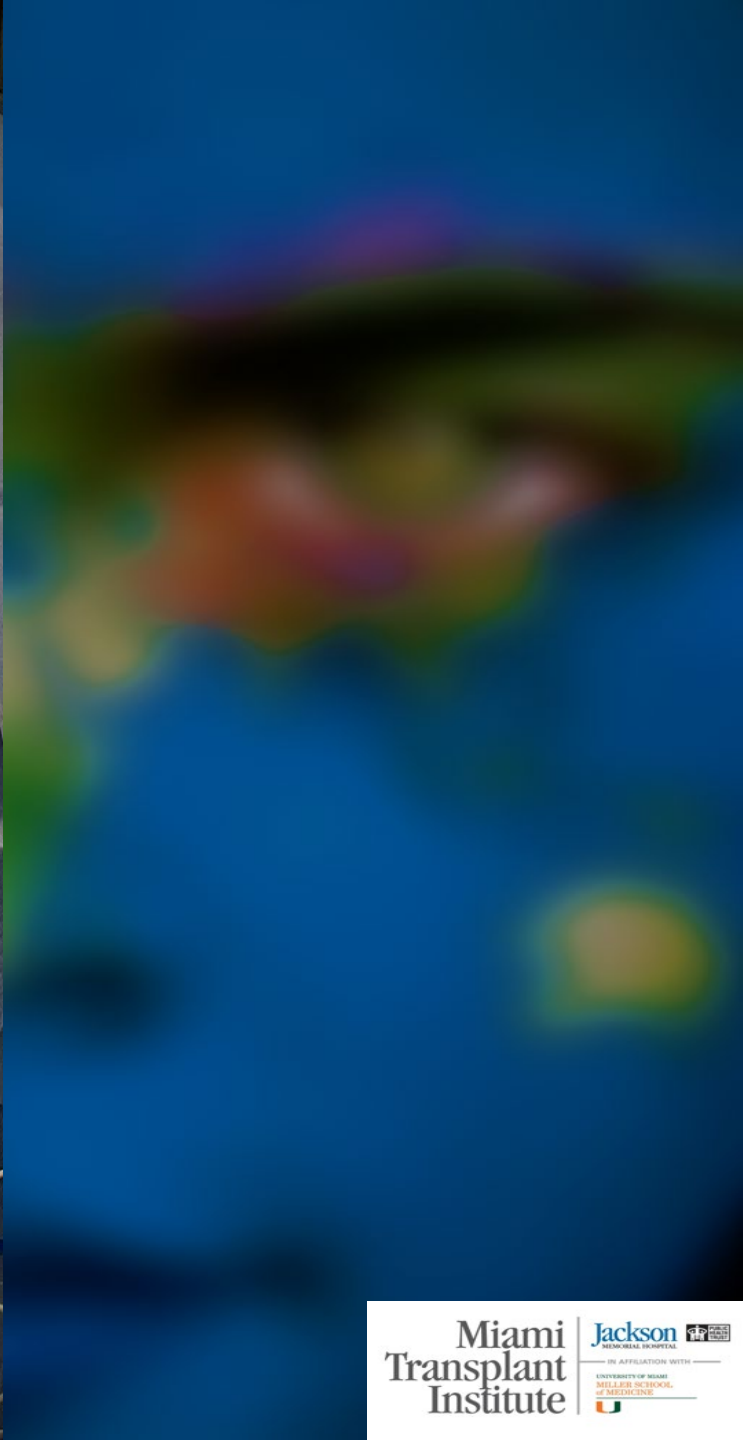
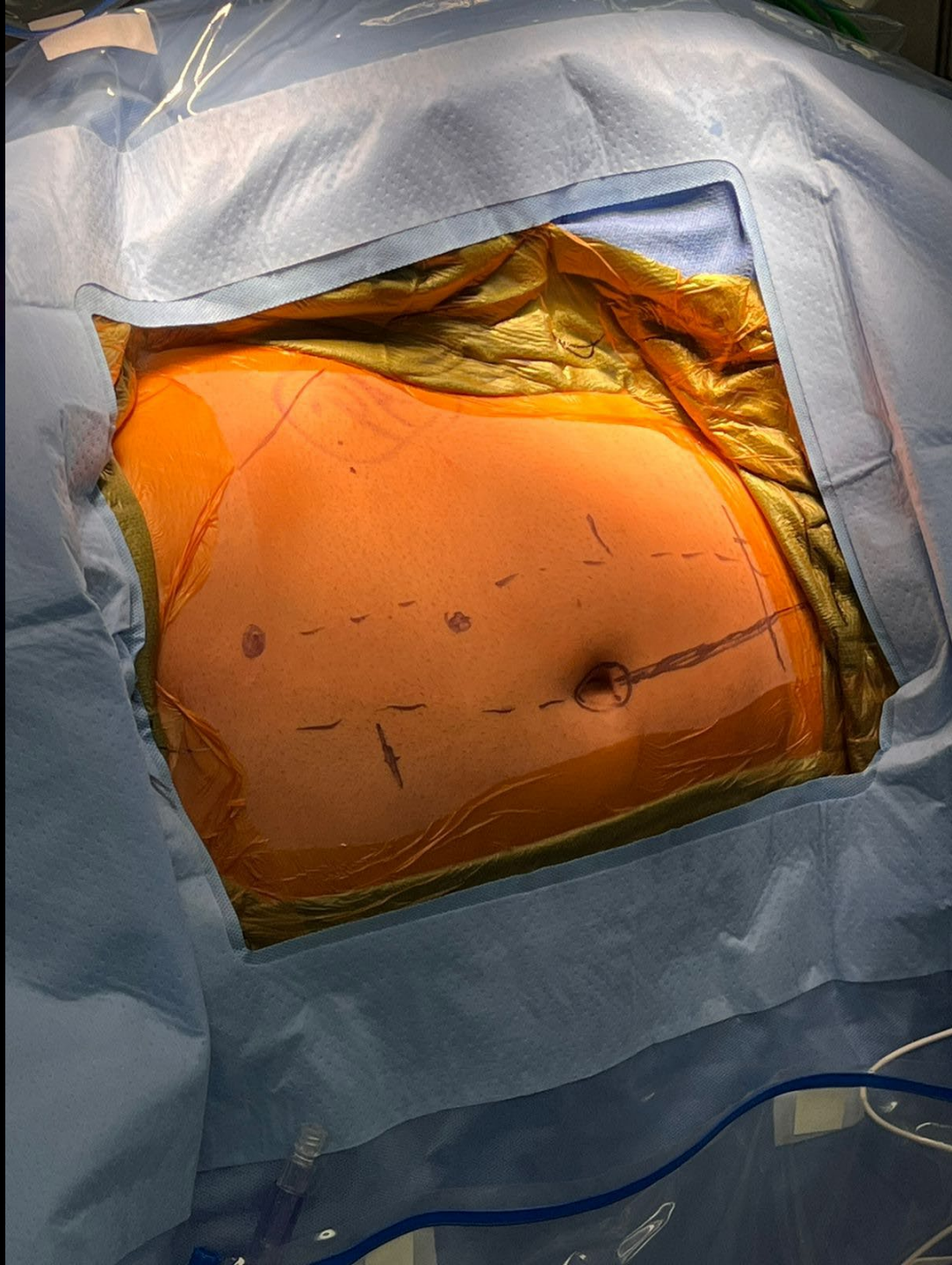


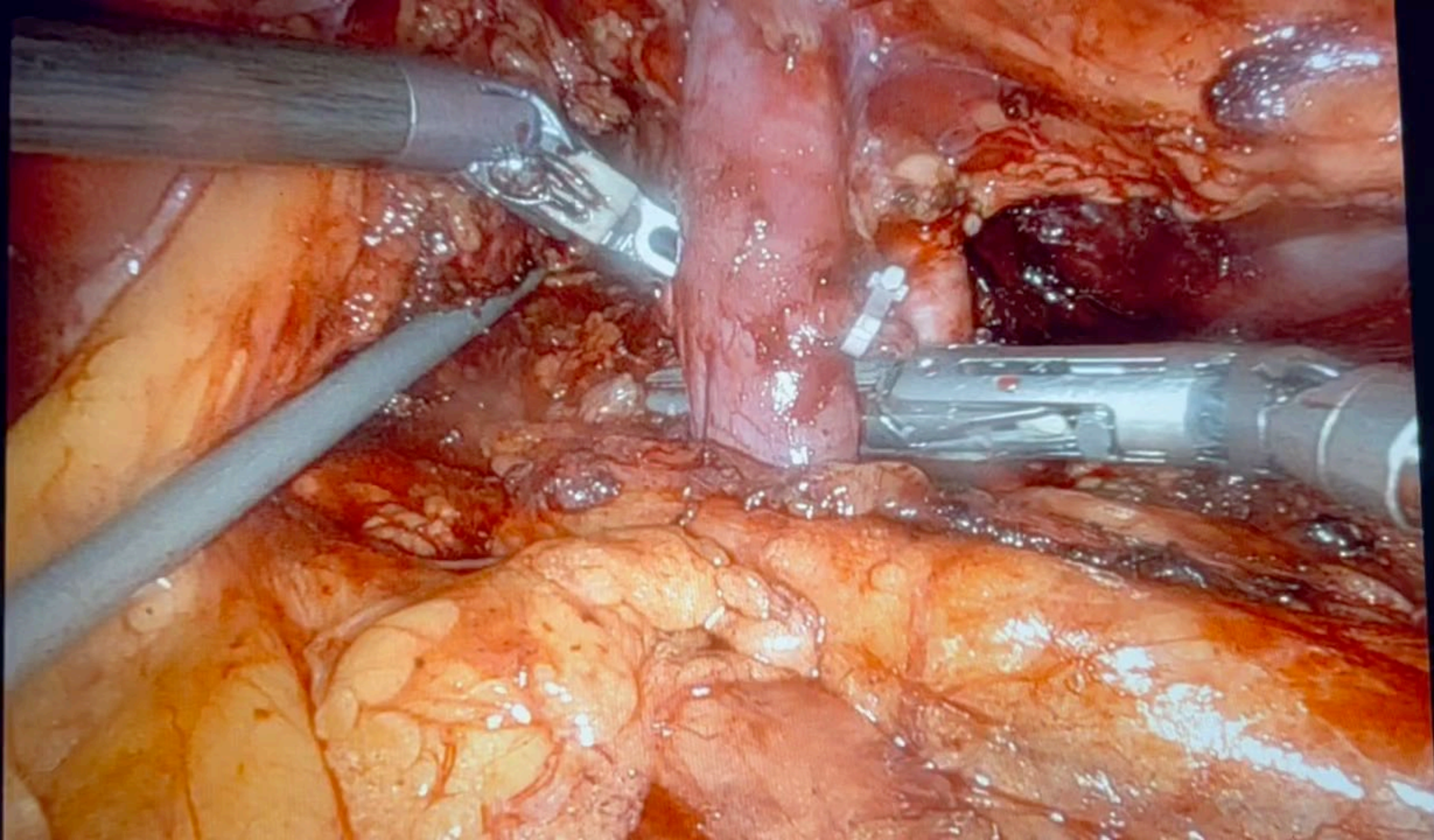
Autotransplantation

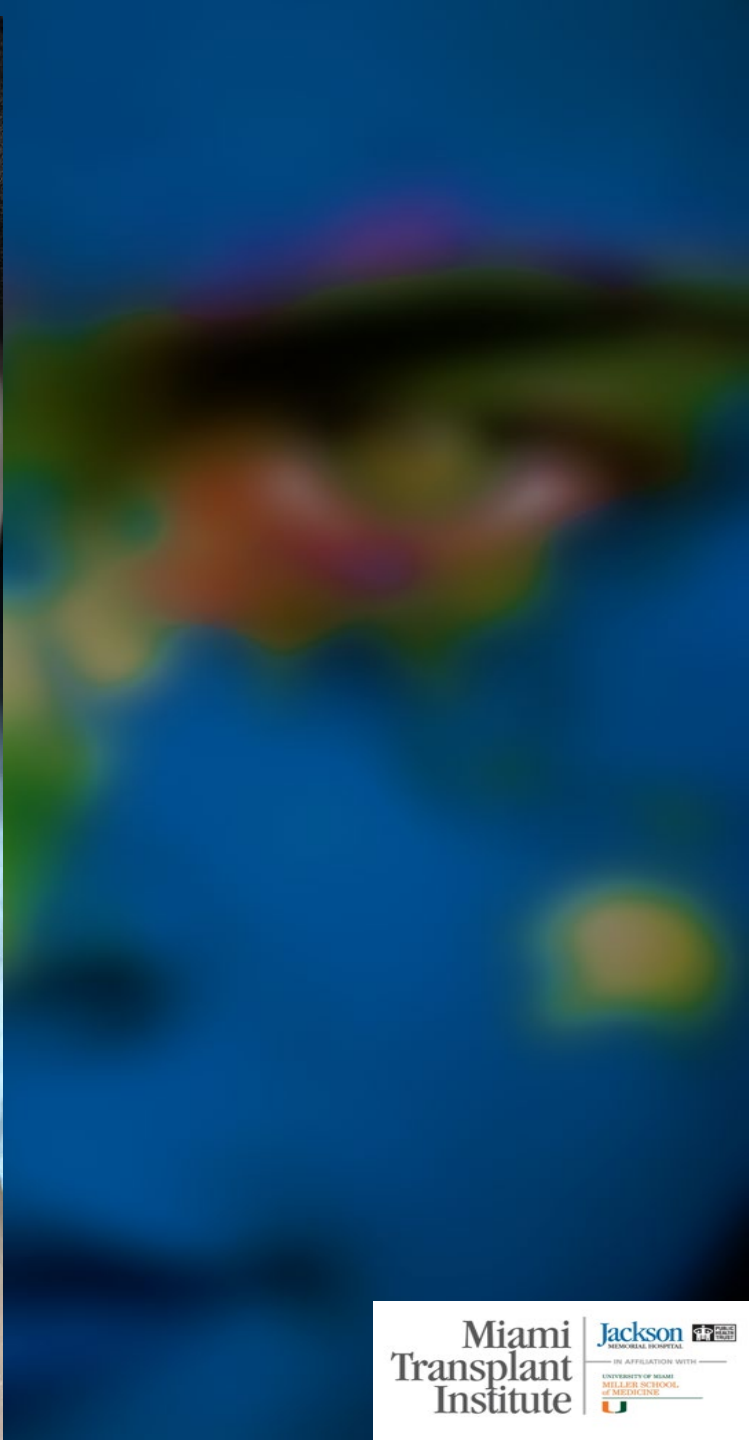
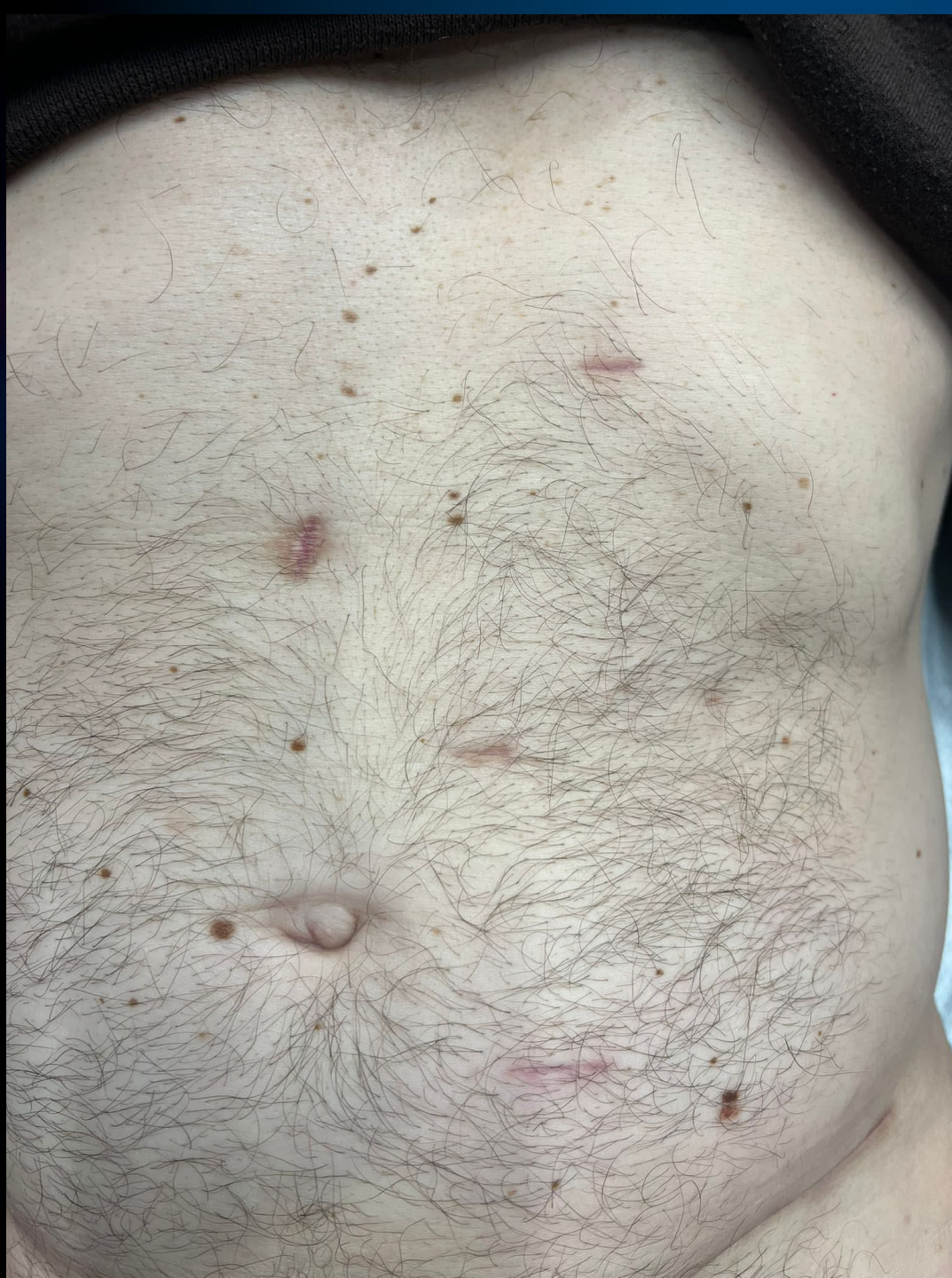
Robotics

DONOR NEPHRECTOMY





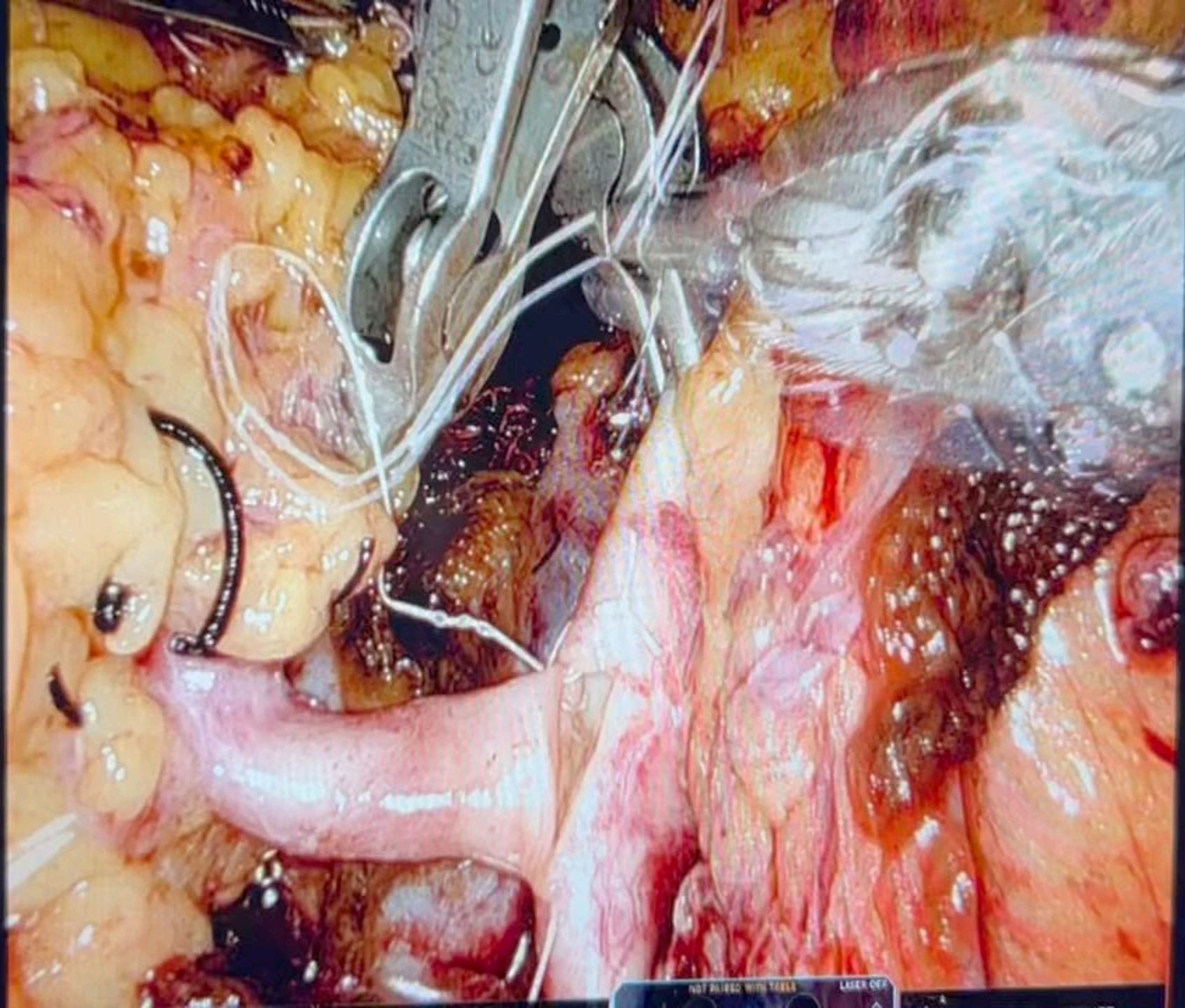


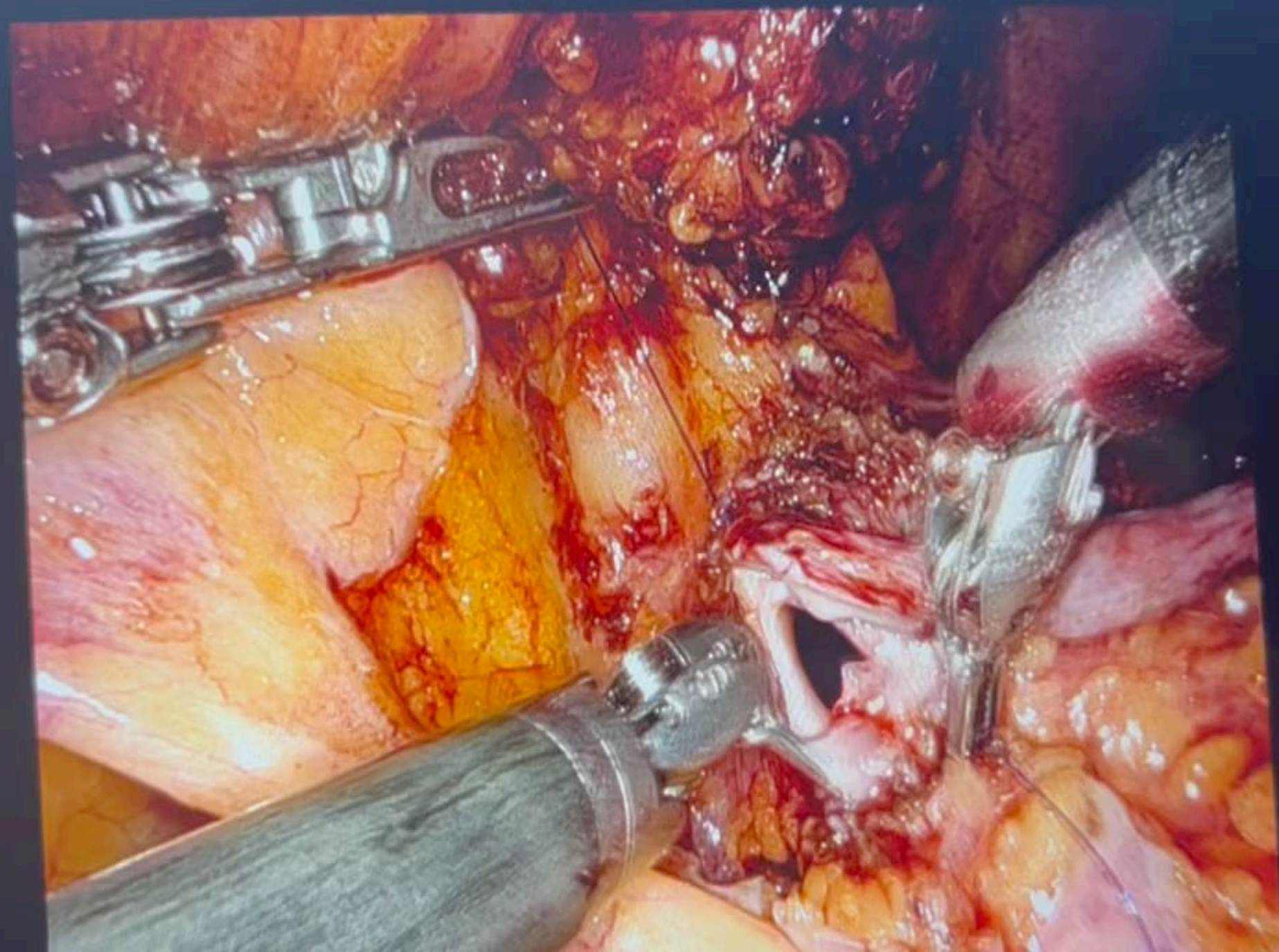


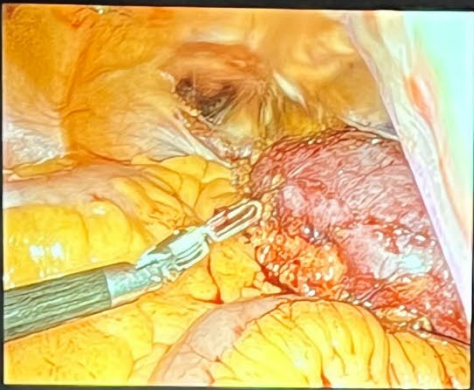
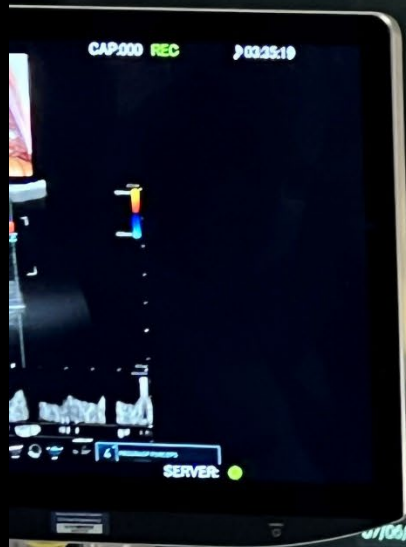
KIDNEY TRANSPLANT RECIPIENT







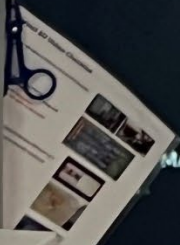
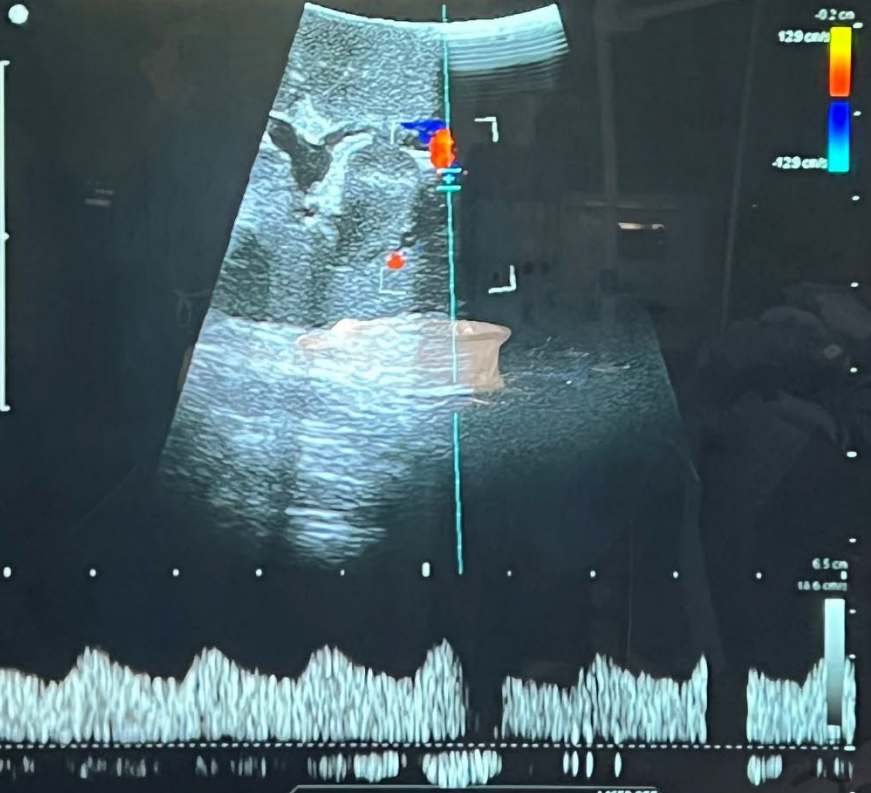




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B Freq	12.00 Hz
M 1.67-1.70	TIS: 0.5-3.0
Res / Hz	4/17 Hz
B Gan	50 %
Dyn. Range	75 dB
Harmonic	Off
Perist	3
Edge	3
Noise Reject	15
ETD	3
C Gan	50 %
C PRF	2.0 Hz
Wall Filter	60 Hz
C Freq	6.00 Hz



FENESTRATED
BIPOLAR FORCEPS

COAG

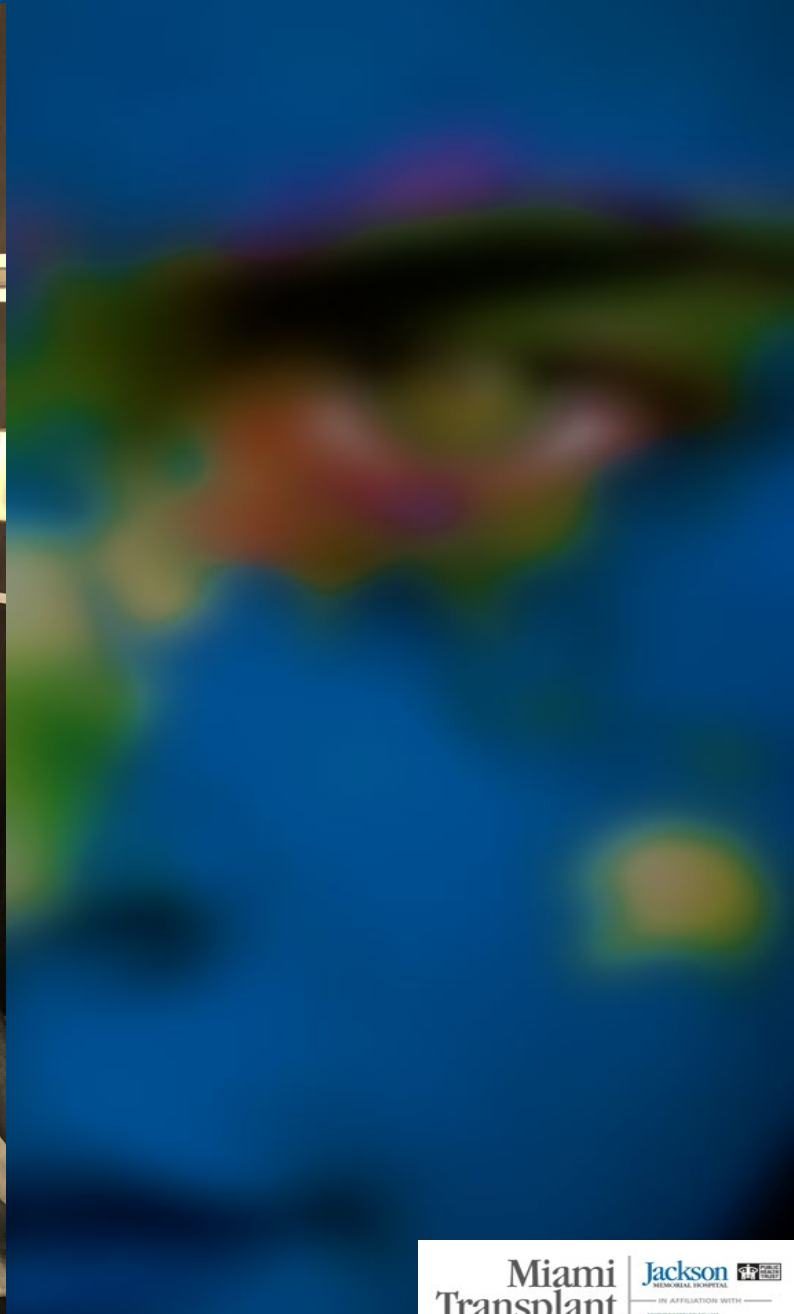
2 BLACK DIAMOND MICRO FORCEPS

3

11° 0° 1x 30°

4 PROGRASP FORCEPS

LASER OFF





Oncology



Colorectal Liver Metastasis

FEATURE

Liver Transplantation for Nonresectable Liver Metastases From Colorectal Cancer

Morten Hagness, MD,† Aksel Foss, MD, PhD,*† Pål-Dag Line, MD, PhD,* Tim Scholz, MD, PhD,* Pål Foyn Jørgensen, MD, PhD,* Bjarte Fosby, MD,*† Kirsten Muri Boberg, MD, PhD,‡ Øystein Mathisen, MD, PhD,§ Ivar P. Gladhaug, MD, PhD,†§ Tor Skatvedt Egge, MD,¶ Steinar Solberg, MD, PhD,|| John Hausken, MD,** and Svein Dueland, MD, PhD††*

SECA-I
2013

ORIGINAL ARTICLE

Survival Following Liver Transplantation for Patients With Nonresectable Liver-only Colorectal Metastases

Svein Dueland, MD,✉ Trygve Syversveen, MD,† Jon Magnus Solheim, MD,‡ Steinar Solberg, MD,§ Harald Grut, MD,† Bjørn Atle Bjørnbeth, MD,¶ Morten Hagness, MD,‡ and Pål-Dag Line, MD‡||*

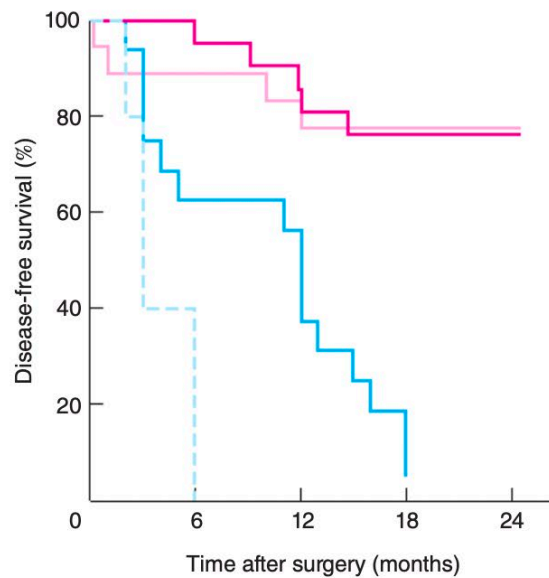
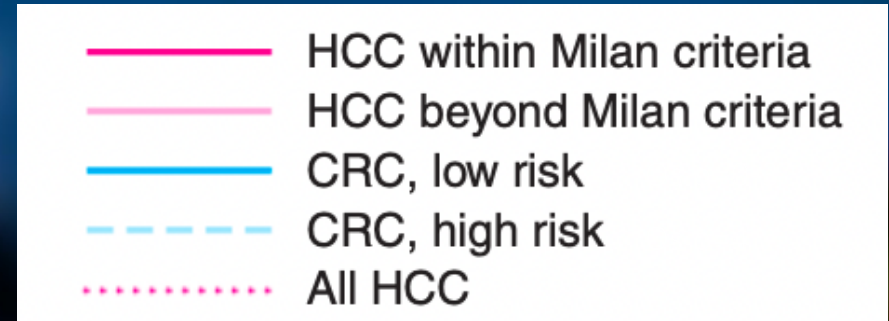
SECA II
2019

Survival following liver transplantation for liver-only colorectal metastases compared with hepatocellular carcinoma

S. Dueland^{1,4} , A. Foss^{2,3}, J. M. Solheim², M. Hagness² and P.-D. Line^{2,3}

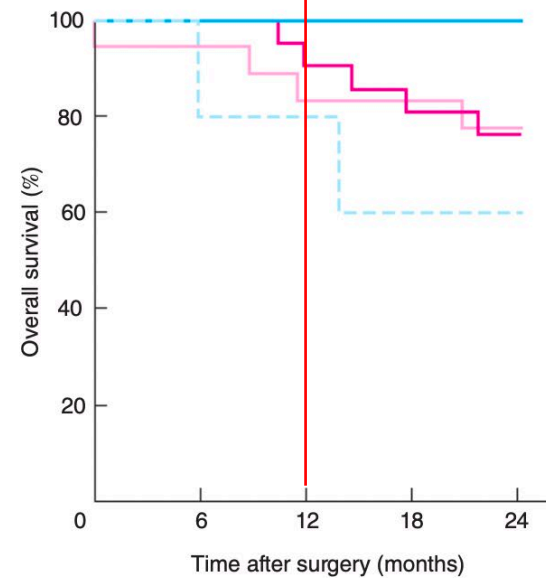
¹Department of Oncology and ²Section for Transplantation Surgery, Department of Transplantation Medicine, Oslo University Hospital, and ³Institute of Clinical Medicine, University of Oslo, Oslo, and ⁴Department of Mathematics and Natural Science, University of Stavanger, Stavanger, Norway

Correspondence to: Dr S. Dueland, Department of Oncology, Oslo University Hospital, Postbox 4950, Nydalen, N-0424 Oslo, Norway (e-mail: svedue@ous-hf.no)



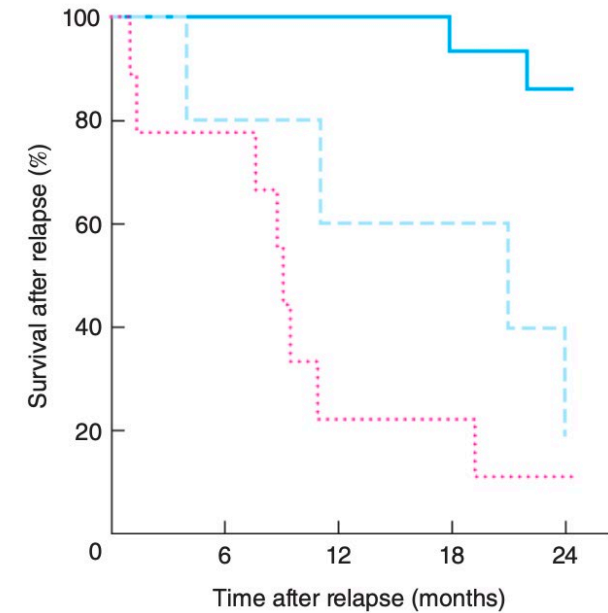
No. at risk	0	6	12	18	24
HCC within Milan	21	21	18	16	16
HCC beyond Milan	18	16	15	14	14
CRC, low risk	16	10	9	3	0
CRC, high risk	5	2	0	0	0

a Disease-free survival



No. at risk	0	6	12	18	24
HCC within Milan	21	21	19	18	16
HCC beyond Milan	18	17	15	15	14
CRC, low risk	16	16	16	16	16
CRC, high risk	5	5	4	3	3

b Overall survival



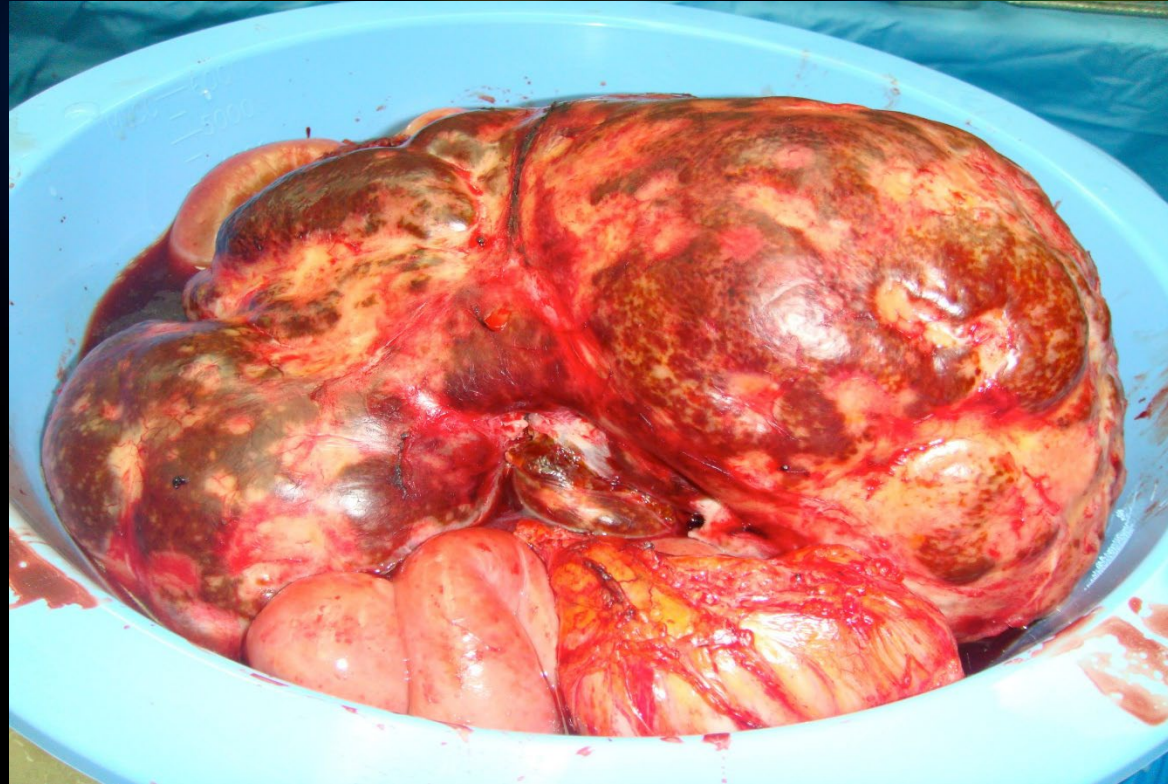
No. at risk	0	6	12	18	24
HCC	9	7	2	2	1
CRC, low risk	15	15	15	15	12
CRC, high risk	5	4	3	3	2

c Survival after relapse



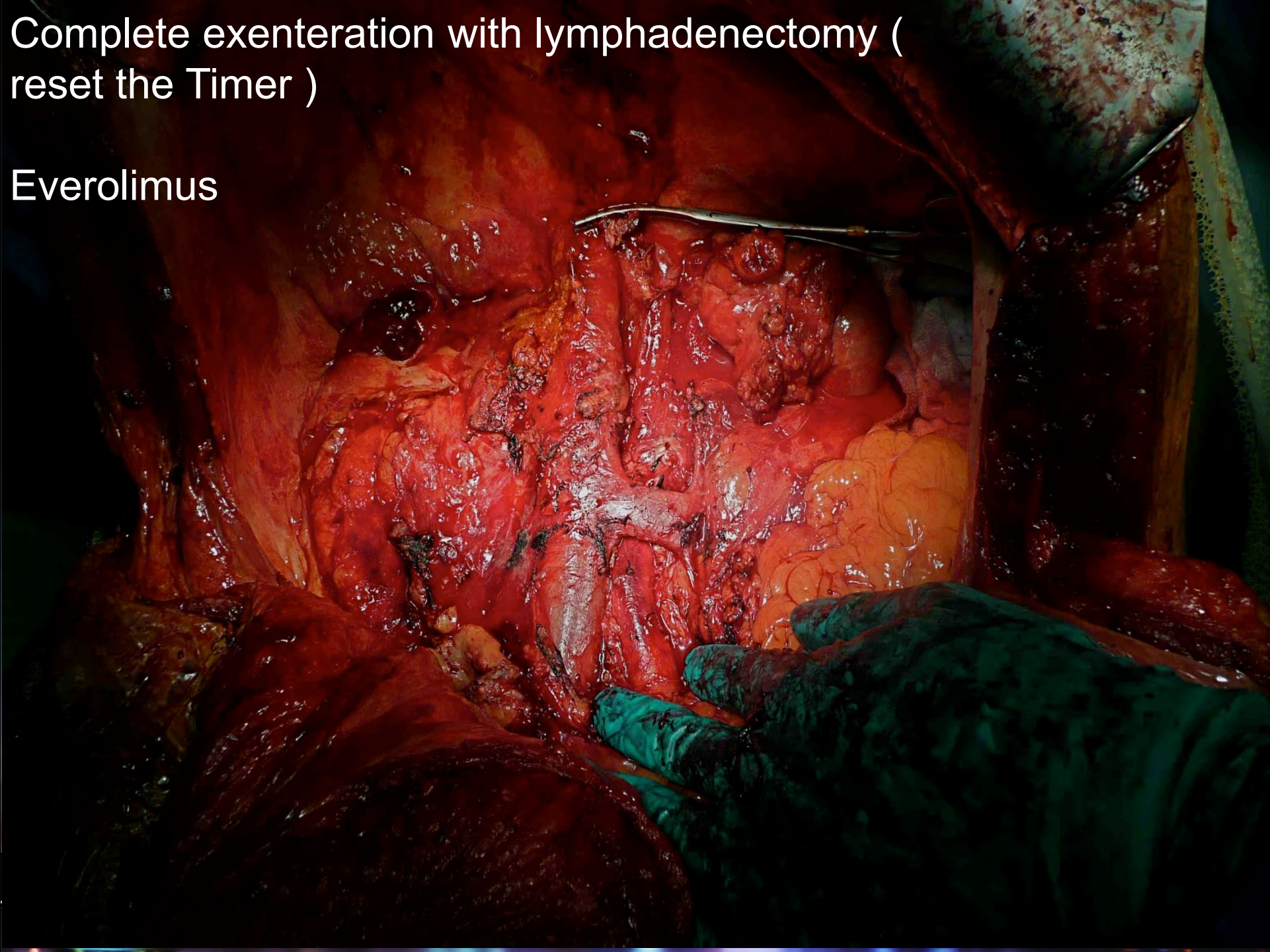
Neuroendocrine tumors

Neuroendocrine tumors



Complete exenteration with lymphadenectomy (reset the Timer)

Everolimus







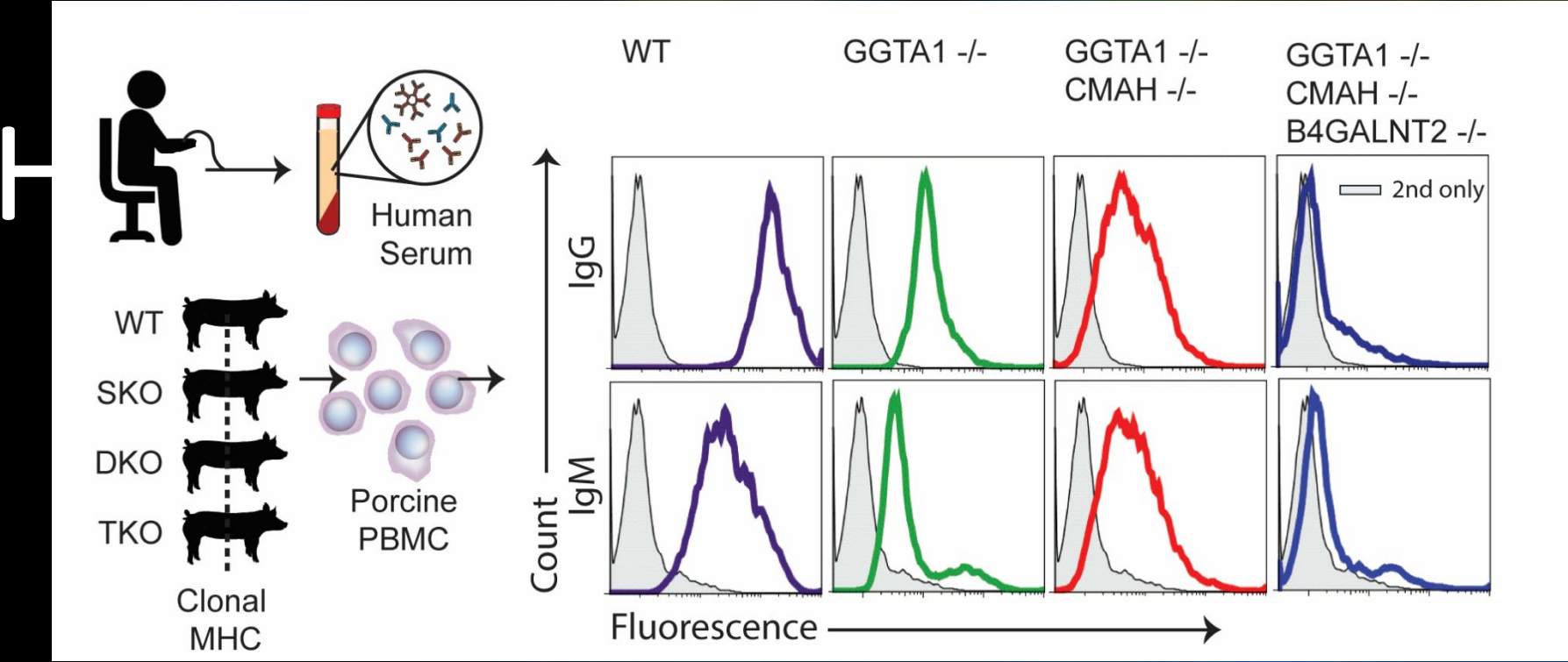
XENOTRANSPLANTATION

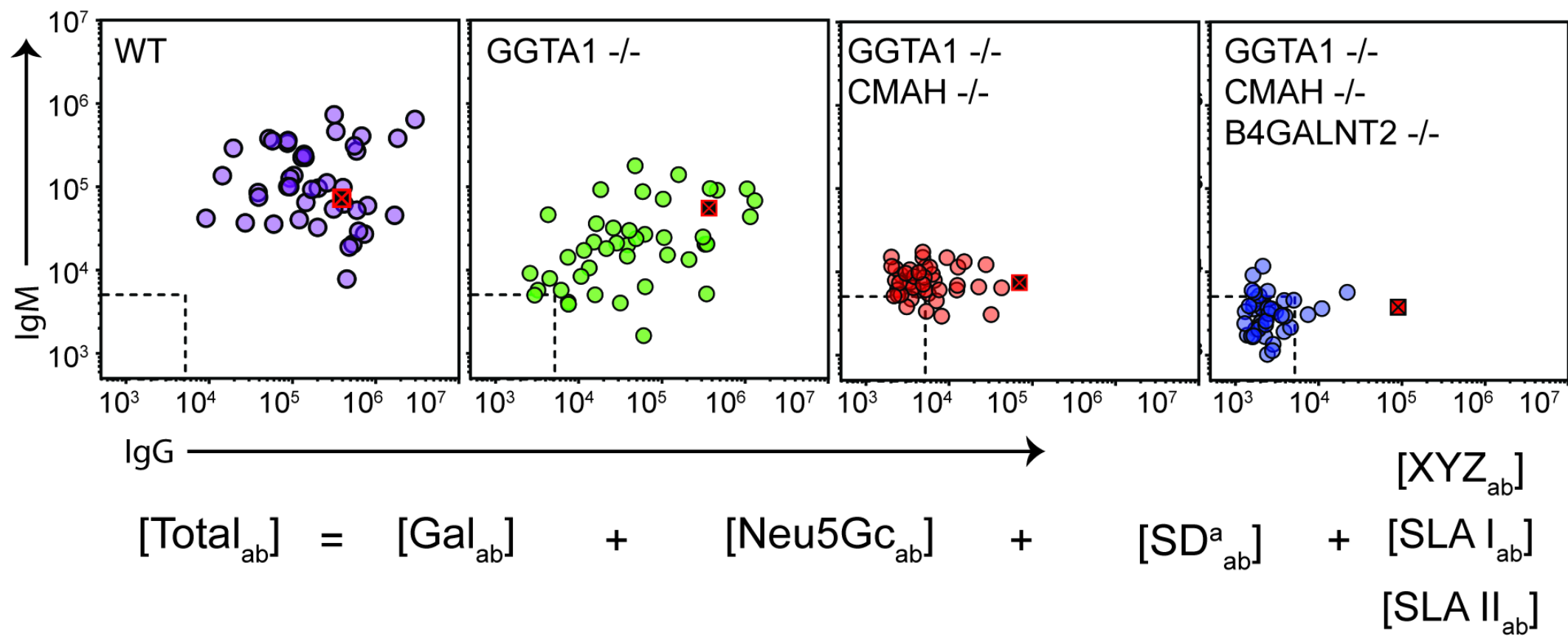
GGTA1/CMAH/ β 4GALNT2 Knockout Pigs



Pigs grow normally up to 100-200 kg
No recognized phenotypic abnormalities

Histocompatibility Testing







Thank you