

# Peri-operative care in liver surgery.

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1<sup>ST</sup> Maastricht E-AHPBA Postgraduate course.  
2<sup>nd</sup> June 2016.



# Components of peri-operative care.

1. Pre-operative care
2. Intra-operative management
3. Post-operative care.

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## Components of pre-operative care.

1. Patient factors: case selection criteria.
2. Extent of disease criteria: staging.
3. Liver resection planning: assessment of liver quality, type of resection and liver reserve (future remnant liver).

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# Patient selection: information and choice.

1. Provision of information and counselling.
2. Discussion of intended benefits, risks and alternatives.

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## Patient selection: assessment of co-morbidity.

1. Baseline assessment of liver and renal function.
2. Static tests of cardiac and respiratory function include:

ECG, pulmonary function tests.

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# Patient selection: functional assessment of co-morbidity.

## Original article

## Cardiopulmonary exercise testing for preoperative risk assessment before hepatic resection

M. A. Junejo<sup>1</sup>, J. M. Mason<sup>3</sup>, A. J. Sheen<sup>1</sup>, J. Moore<sup>2</sup>, P. Foster<sup>2</sup>, D. Atkinson<sup>2</sup>, M. J. Parker<sup>2</sup>  
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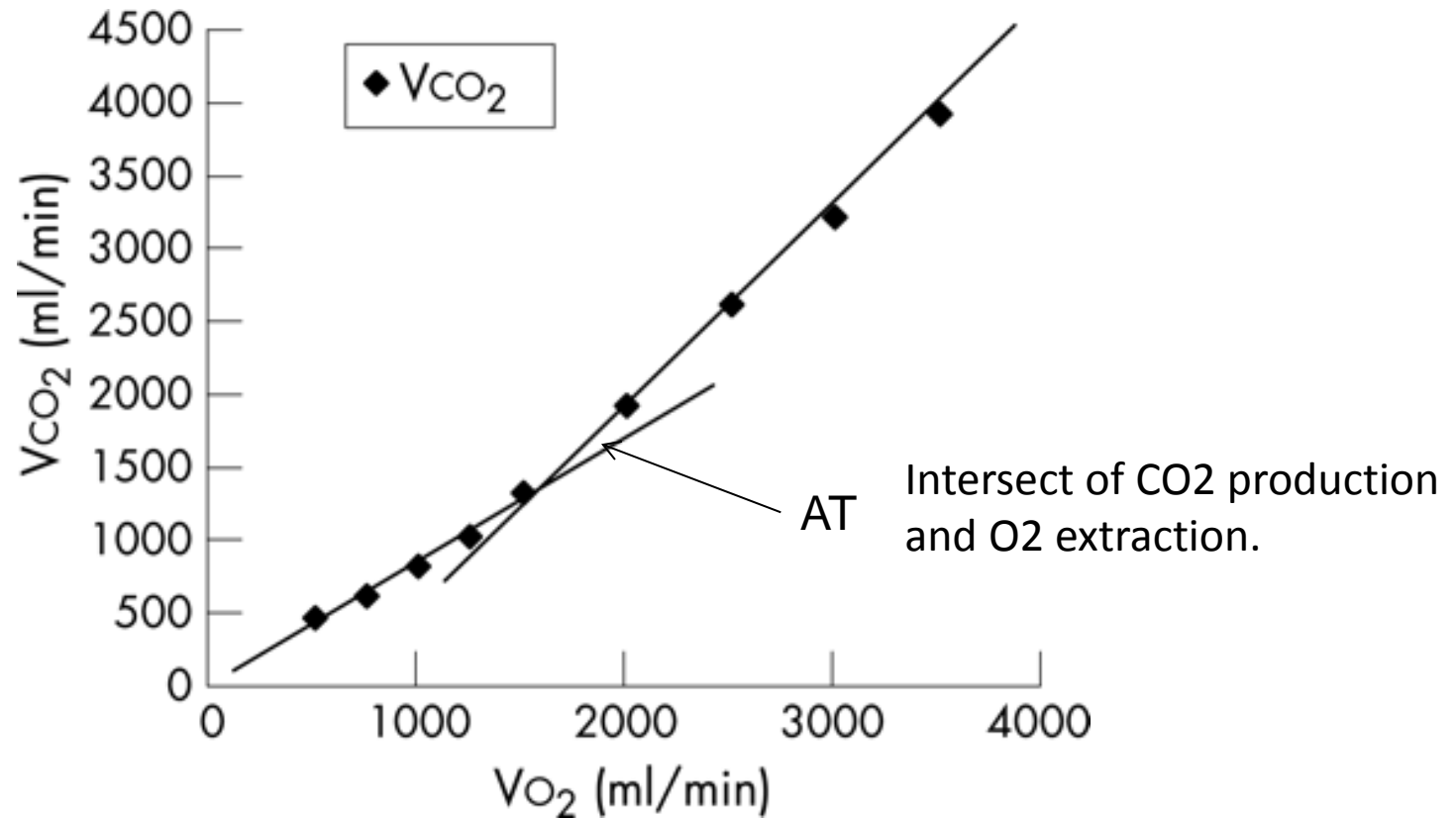
*Correspondence to:* Professor A. K. Siriwardena, Manchester Hepato-Pancreato-Biliary Centre, Manchester Royal Infirmary, Manchester M13 9WL, UK (e-mail: [ajith.siriwardena@cmft.nhs.uk](mailto:ajith.siriwardena@cmft.nhs.uk))



# Cardiopulmonary exercise testing



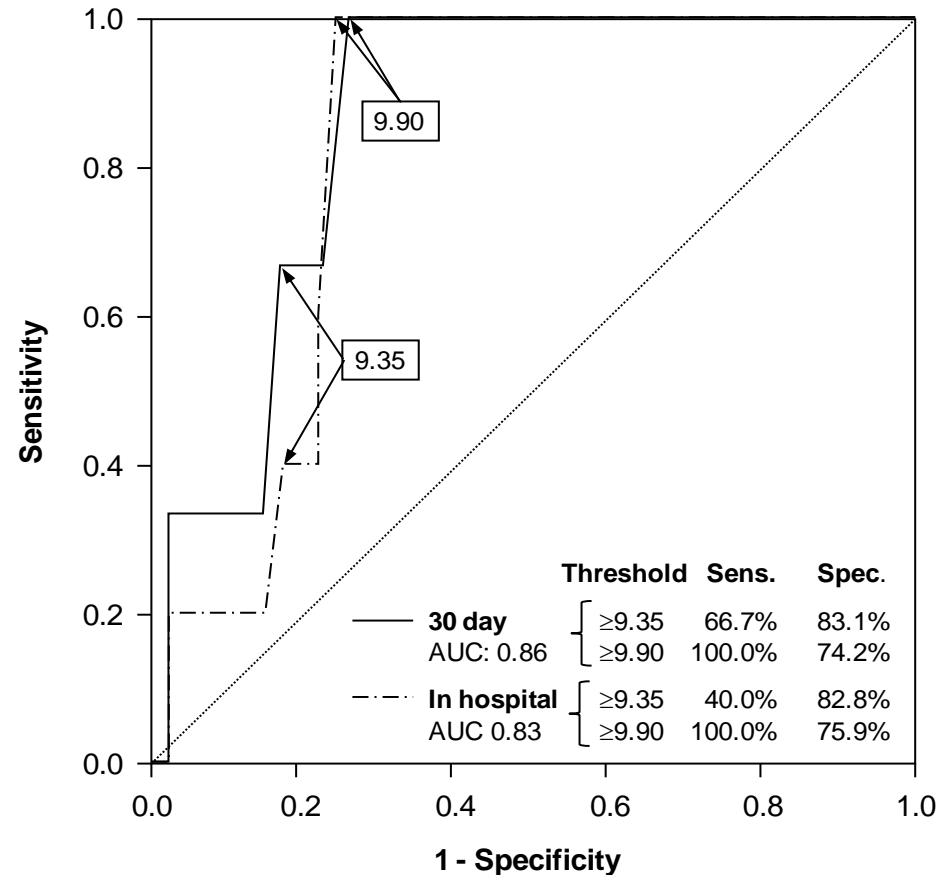
# Anaerobic threshold





## ROC curves for AT as a predictor of post-operative (30 day) and in-hospital mortality

- AT of  $\leq 9.9 \text{ ml/kg/min}$  100% sensitive for post-operative mortality.
- This is an effective rule-out test.
- (No deaths above threshold).



- Cardiopulmonary exercise testing allows for an accurate assessment of functional cardiopulmonary reserve.
- In practice, this allows the clinical team to balance the oncological benefits of surgery with the cardiopulmonary risks.



# Patient selection: assessment of extent of disease.

1. CT thorax, abdomen and pelvis.
2.  $^{18}\text{F}$ Fluro-deoxyglucose positron emission tomography (FDG-PET).

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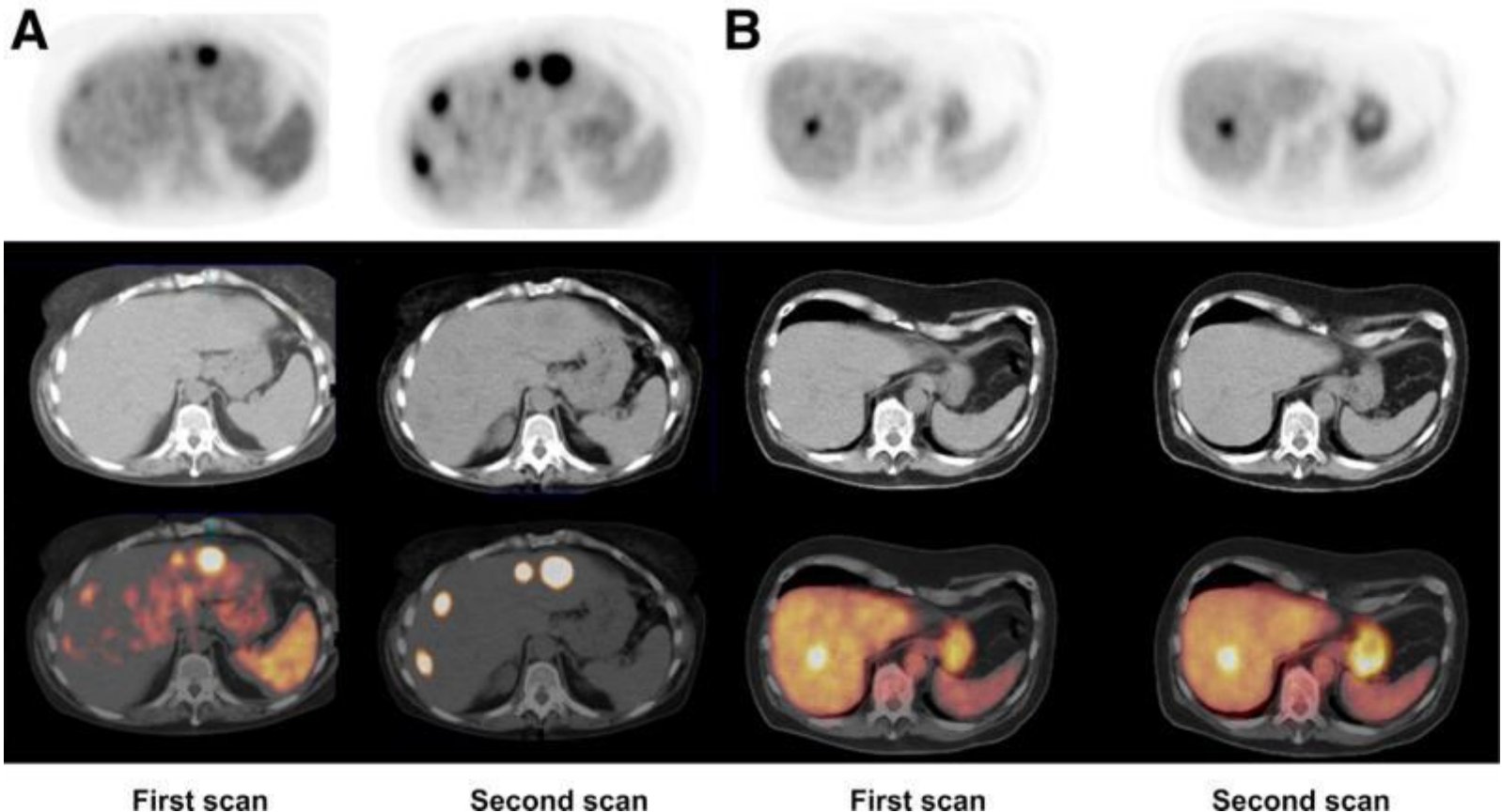


## $^{18}\text{F}$ Fluoro-deoxyglucose positron emission tomography (FDG-PET).

- **Detects the abnormal glucose metabolism of cancer cells.**
- **Isotopic image matched with CT.**
- **False positives can occur with sepsis.**
- **False negatives can occur with mucinous tumours.**



# <sup>18</sup>Fluoro-deoxyglucose positron emission tomography (FDG-PET).



## Patient selection: assessment of extent of liver resection.

1. In a non-cirrhotic liver up to two-thirds can be resected.
2. Cirrhosis or prior chemotherapy compromises reserve.

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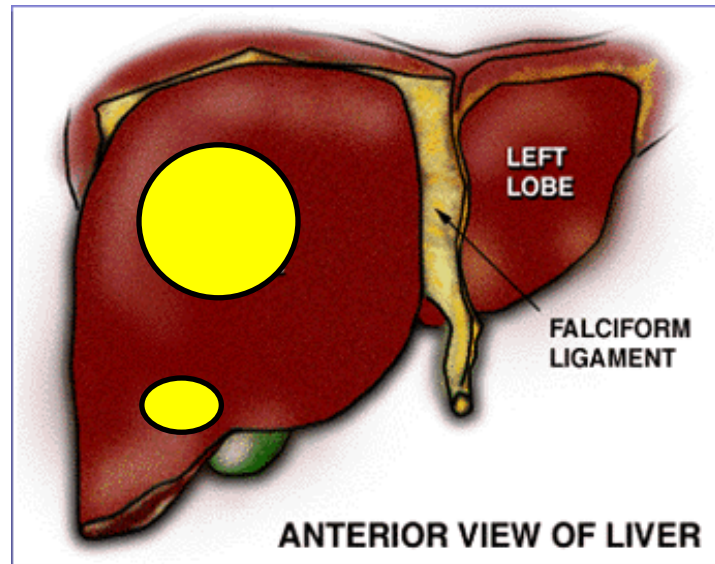


## Patient selection: assessment of extent of liver resection: liver imaging.

1. Contrast-enhanced MR has best accuracy.
2. DWI images show restricted diffusion into non-hepatocyte tissue.
3. T2 phase identifies small cysts.



# Patient selection: assessment of extent of liver resection.

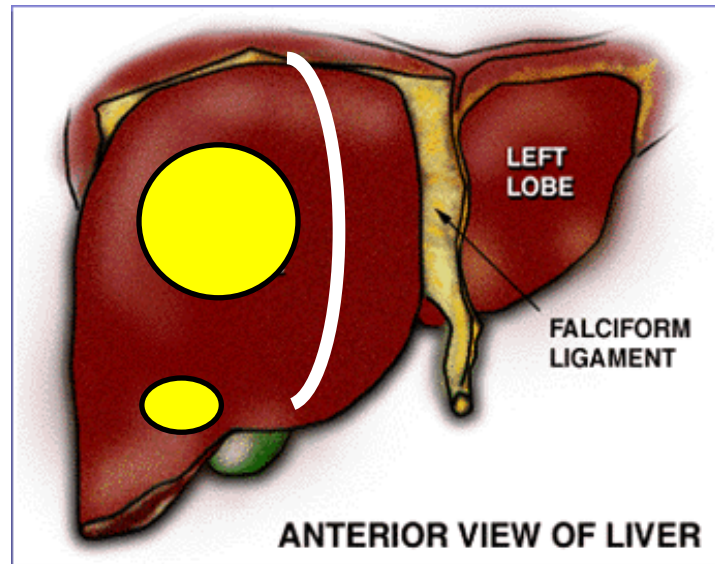


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# Patient selection: assessment of extent of liver resection.



**Parenchyma preservation.**

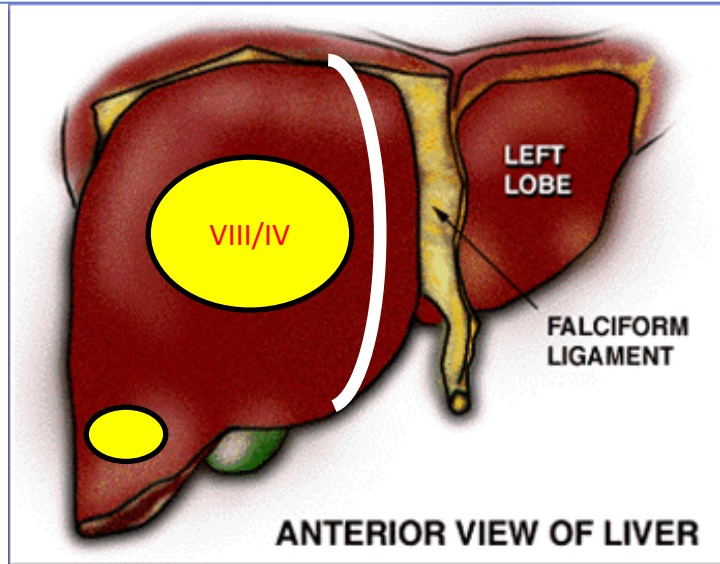
**Preservation of intact left liver inflow.**

**Preservation of LHV and MHV**

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# Patient selection: assessment of extent of liver resection.



**Rt trisectionectomy:**

**Likely to require modification of FRL.**

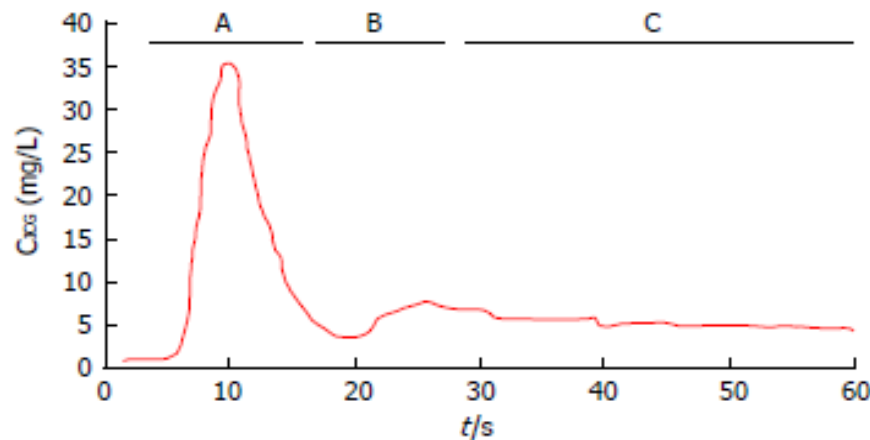
**Option 1: modify liver - Rt PVE.**

**Option 2: modify disease:  
Downsizing chemotherapy.**

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# Patient selection: assessment of extent of liver resection.

1. Functional reserve can be assessed by indocyanine dye clearance.



**Figure 2 Indocyanine green dilution curve.** A: First peak; B: Second peak (re-circulation phase); C: Elimination phase (Modified from Vos et al<sup>[6]</sup>, 2014). ICG: Indocyanine green;  $C_{ICG}$ : ICG blood concentration.

# Patient selection: assessment of extent of liver resection.

1. Functional reserve can be assessed by indocyanine dye clearance.

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## Patient selection: assessment of extent of liver resection in cirrhosis.

1. Different options: TACE vs Transplant vs resection.
2. Resection in cirrhosis requires careful assessment of liver plasticity: transjugular portal venous wedge pressure ( $> 10$  m Hg indicates high risk of liver failure).



## Intra-operative management of pt during major open hepatectomy: anaesthesia.

1. General anaesthesia (avoid liver metabolised agents) + epidural or wound catheters.
2. Central line, arterial line, urinary catheter, body-warming insufflating wrap, calf-compression boots.

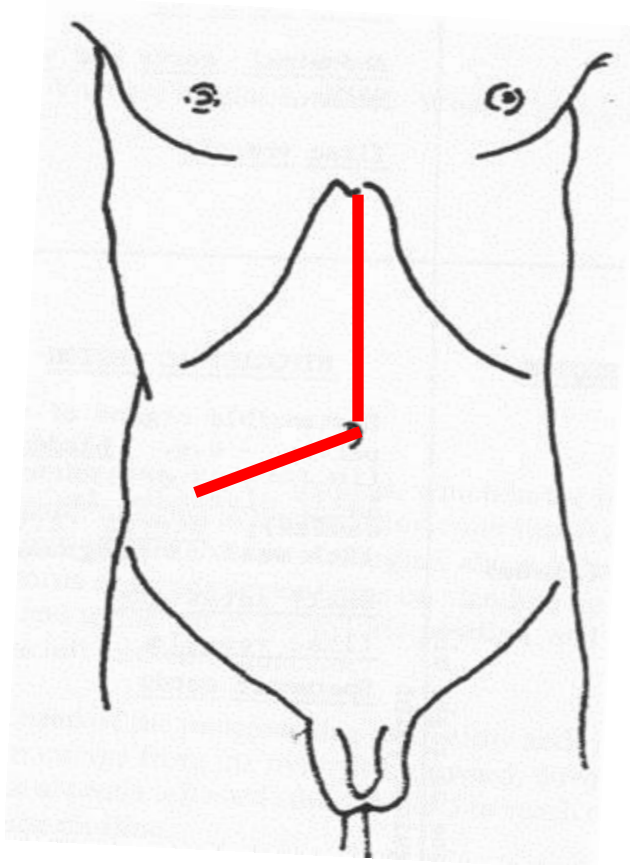


## Intra-operative management of pt during major open hepatectomy: anaesthesia.

4. Cross-match (2 units for major resection).
5. No routine requirement for cell-saver.
6. No pharmacological intervention to lower CVP.



## Intra-operative care: incision/access.



- Epigastric midline with right transverse.
- Fixed bi-subcostal retraction.





## Intra-operative management of pt during major open hepatectomy: intra-operative.

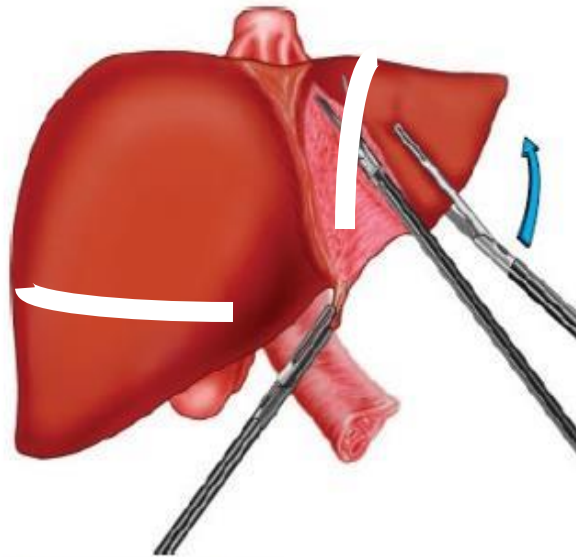
1. Mobilisation, intra-operative ultrasonography.
2. Transection: CUSA [ligaclips plus vascular stapler for RHV and major branches].
3. Intermittent inflow occlusion [Pringle].



## Laparoscopic liver resection: key differences in anaesthetic preparation.

1. Central line, arterial line, urinary catheter still necessary but no epidural.
2. Body warmer, calf-compression.
3. No pharmacological reduction of CVP.





**a** Parenchymal transection



## Post-operative care: specific aspects of liver surgery after-care.

1. Haemorrhage.
2. Liver failure.
3. Bile leak.



ORIGINAL ARTICLE

# Post-hepatectomy haemorrhage: a definition and grading by the International Study Group of Liver Surgery (ISGLS)

Nuh N. Rahbari<sup>1</sup>, O. James Garden<sup>2</sup>, Robert Padbury<sup>3</sup>, Guy Maddern<sup>4</sup>, Moritz Koch<sup>1</sup>, Thomas J. Hugh<sup>5</sup>, Sheung Tat Fan<sup>6</sup>, Yuji Nimura<sup>7</sup>, Joan Figueras<sup>8</sup>, Jean-Nicolas Vauthey<sup>9</sup>, Myrddin Rees<sup>10</sup>, Rene Adam<sup>11</sup>, Ronald P. DeMatteo<sup>12</sup>, Paul Greig<sup>13</sup>, Val Usatoff<sup>14</sup>, Simon Banting<sup>15</sup>, Masato Nagino<sup>7</sup>, Lorenzo Capussotti<sup>16</sup>, Yukihiro Yokoyama<sup>7</sup>, Mark Brooke-Smith<sup>17</sup>, Michael Crawford<sup>18</sup>, Christopher Christophi<sup>19</sup>, Masatoshi Makuuchi<sup>20</sup>, Markus W. Büchler<sup>1</sup> & Jürgen Weitz<sup>1</sup>

Grade A	Post-hepatectomy haemorrhage (PHH) requiring transfusion of up to 2 units of blood.
Grade B	PHH requiring transfusion of >2units of blood but manageable without invasive intervention.
Grade C	PHH requiring either radiological intervention(embolisation) or re-laparotomy.



# Post-operative care: assessment and grading of liver failure.

## ORIGINAL ARTICLE

### **Kinetics of liver function tests after a hepatectomy for colorectal liver metastases predict post-operative liver failure as defined by the International Study Group for Liver Surgery**

Keith J. Roberts, Kishore G.S. Bharathy & J. Peter A. Lodge

Department of Liver Surgery, St James University Hospital, Leeds, UK



## ISGLS: Grading of post-operative liver failure

### Grade A:

Normal clinical course or inconsequential transient elevation of transaminase.

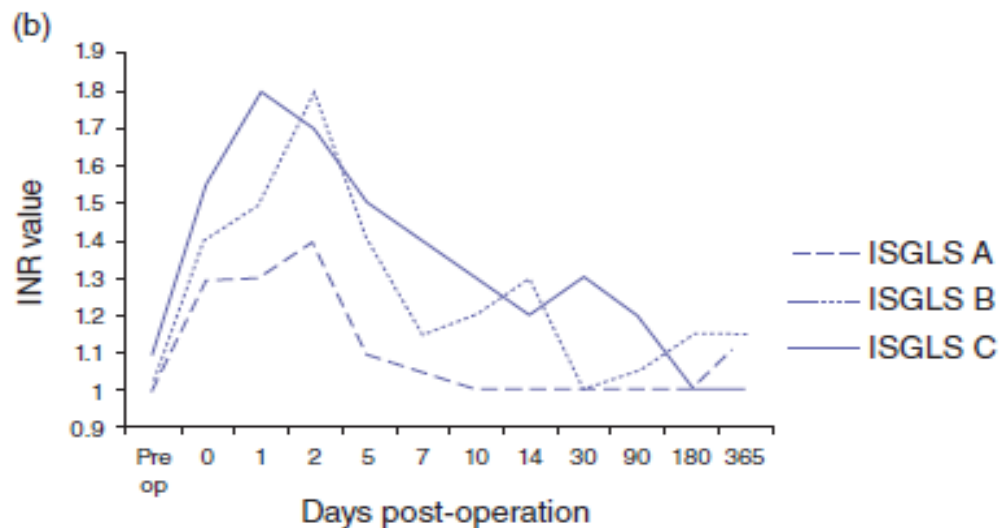
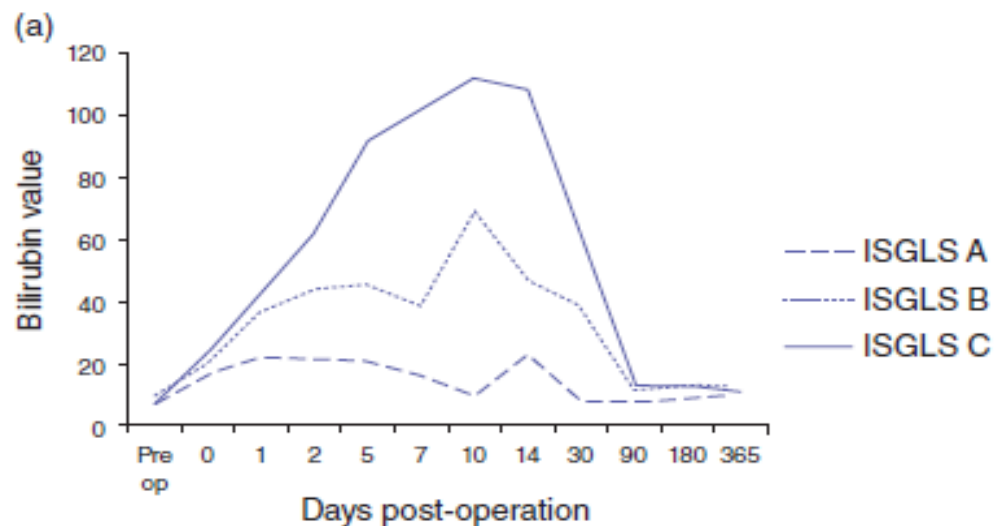
### Grade B:

Patients who require a change in hospital management – e.g.. Longer stay in high-dependency, diuretics for ascites or non-invasive ventilation.

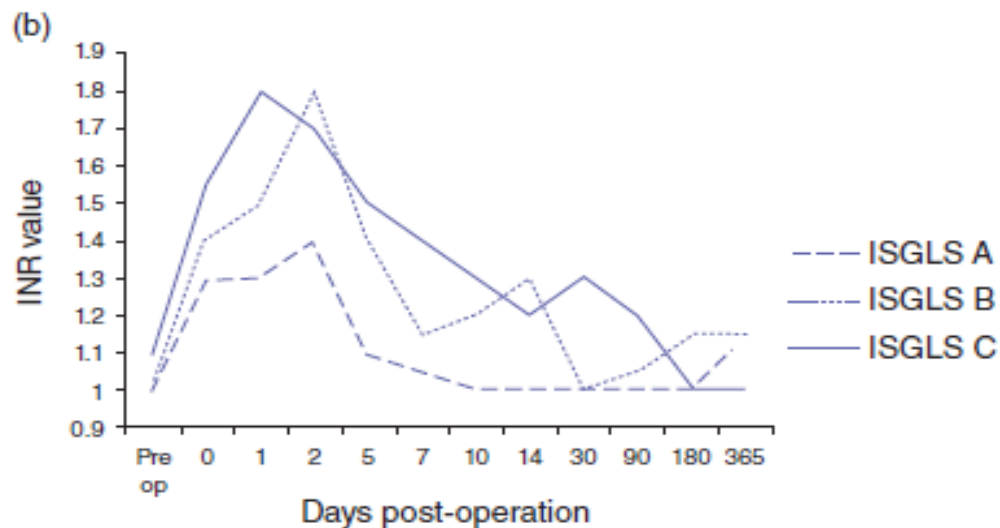
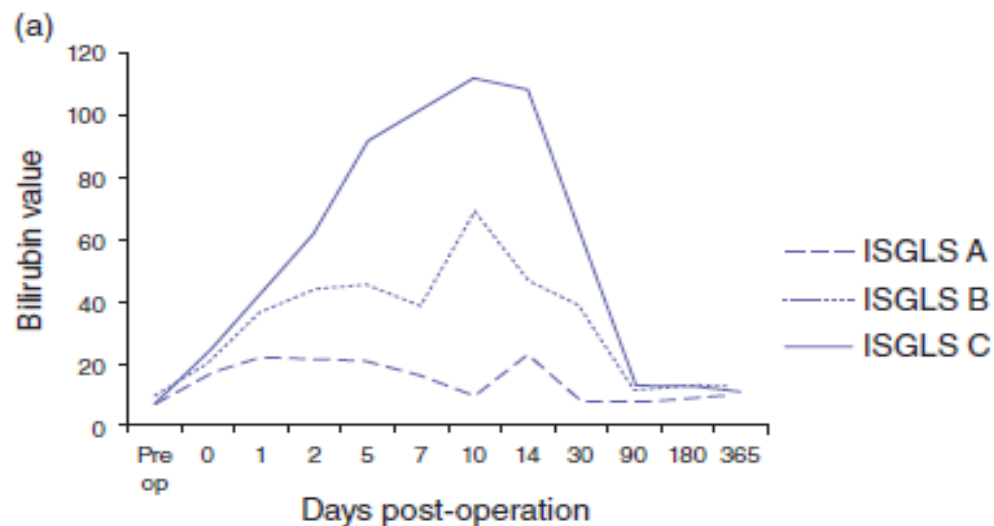
### Grade C:

Invasive management e.g. drainage of ascites, ventilation, renal support.









# The “50-50 Criteria” on Postoperative Day 5

## *An Accurate Predictor of Liver Failure and Death After Hepatectomy*

*Silvio Balzan, MD,\* Jacques Belghiti, MD,\* Olivier Farges, MD, PhD,\* Satoshi Ogata, MD, PhD,\*  
Alain Sauvanet, MD,\* Didier Delefosse, MD,† and François Durand, MD\**

Ann Surg 2005;242:824-829.



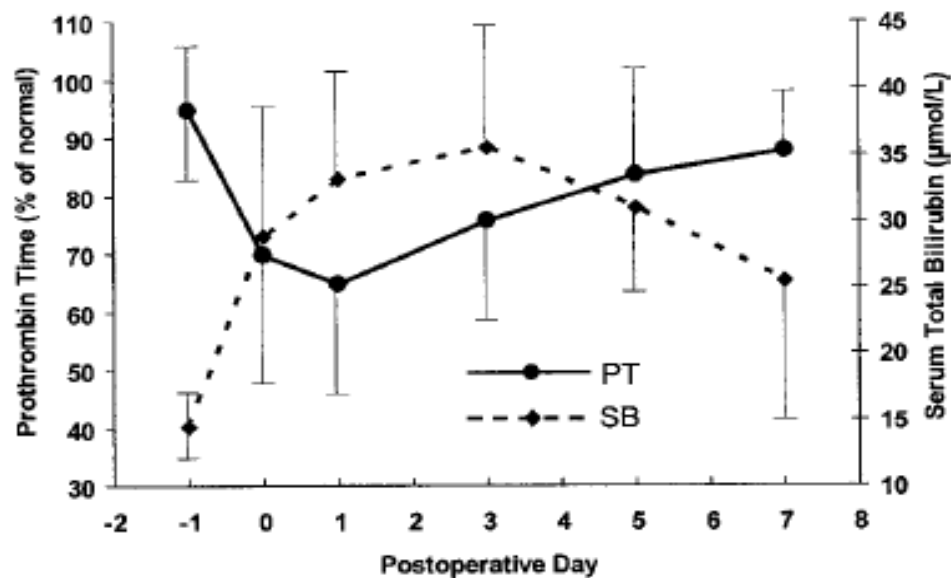


FIGURE 1. Kinetics of postoperative biologic liver function tests. Means and SD of prothrombin time (PT) and total serum bilirubin (SB) in overall group of hepatectomies. Kinetic of postoperative prothrombin time (PT) and serum total bilirubin level (SB).

Ann Surg 2005;242:824-829.



**TABLE 2.** Operative Mortality According to Occurrence of Prothrombin Time <50% and/or Serum Bilirubin <50  $\mu\text{mol/L}$

	POD1	POD3	POD5	POD7
PT				
PT >50%	1.5%	1.3%	1.5%	1%
PT <50%	10%	16%	33%	40%
SB				
SB <50 $\mu\text{mol/L}$	2.7%	1.9%	1.1%	1.5%
SB >50 $\mu\text{mol/L}$	7%	11%	15%	17%
"50-50 criteria"				
PT >50% and SB <50 $\mu\text{mol/L}$	1.3%	0.8%	1.2%	0.6%
PT <50% and SB >50 $\mu\text{mol/L}$	14%	19%	59%	63%
POD indicates postoperative day; PT, prothrombin ratio; SB, serum total bilirubin level.				

In a series of 775 hepatectomies, the association of a prothrombin ratio <50% of normal and a serum bilirubin >50 $\mu\text{mol/L}$  on POD 5 was associated with a 50% risk of death.

Ann Surg 2005;242:824-829.



## International Study Group for Liver Surgery (ISGLS): Definition and categorisation of post-hepatectomy bile leak.

According to the ISGLS a post-operative bile leak is present when plasma bilirubin is 3 x greater than serum bilirubin.

### **Grade A:**

Bile leak requiring little change in management.

### **Grade B:**

Grade A bile leak persisting for more than 7 days.

B1: without radiologic intervention.

B2: requiring radiologic or endoscopic intervention.

### **Grade C:**

Biloma requiring laparotomy.



## Summary.

- Modern hepatobiliary surgery requires careful attention to detail in patient selection, meticulous surgery and co-ordinated aftercare.
- Bear in mind the compromise to hepatic synthetic function (especially in patients with cirrhosis and those who have had prior chemotherapy) and the need to support and correct this.



# Thank you.



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# 12<sup>th</sup> Biennial E-AHPBA Congress 2017

European-African Hepato-Pancreato-Biliary Association

## SAVE THE DATE

May, 23<sup>rd</sup> – 26<sup>th</sup>, 2017  
Mainz, Germany

### Congress chairman:

**Professor Dr. med.**  
**Hauke Lang, MA, FACS**  
University Medical Center, Mainz

Registration & Abstract Submission:  
[www.eahpba2017.com](http://www.eahpba2017.com)

**Abstract submission opens 1<sup>st</sup> August 2016.**

**Abstract acceptance stats (including videos) for E-AHPBA Manchester 2015:**

**584 submissions**

**544 acceptance (93%)**

**All accepted abstracts published in HPB.**