Cytoreduction and HIPEC for colorectal carcinomatosis

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HIPEC:

H yperthermic
I ntra
PE ritoneal
C hemotherapy

Cytoreduction and HIPEC for colorectal carcinomatosis

- introduction
- technique
- results
- indications

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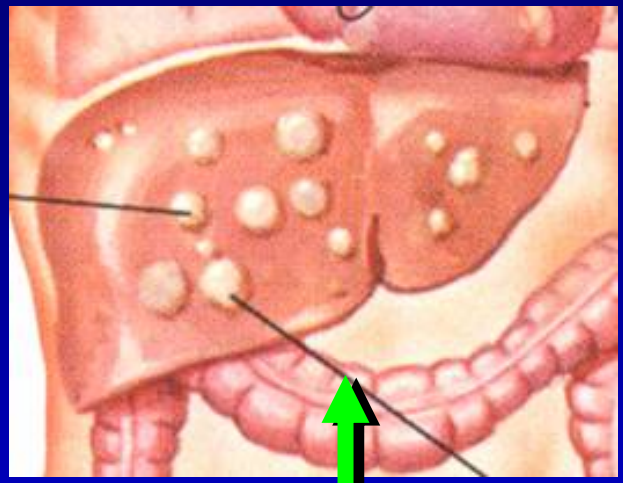
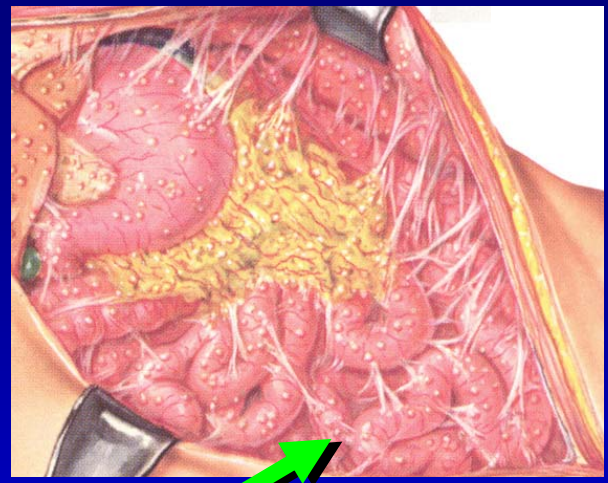
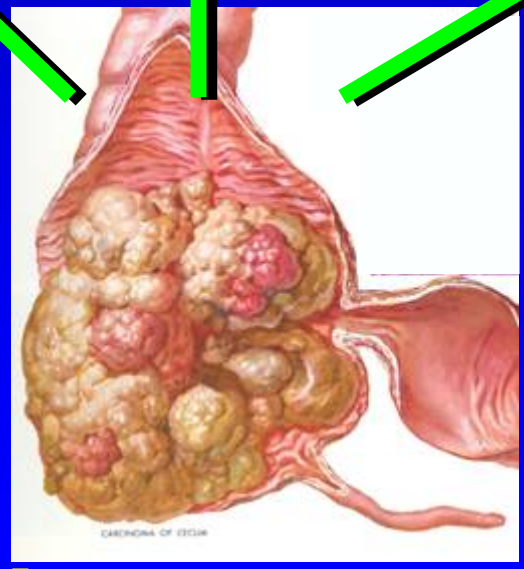




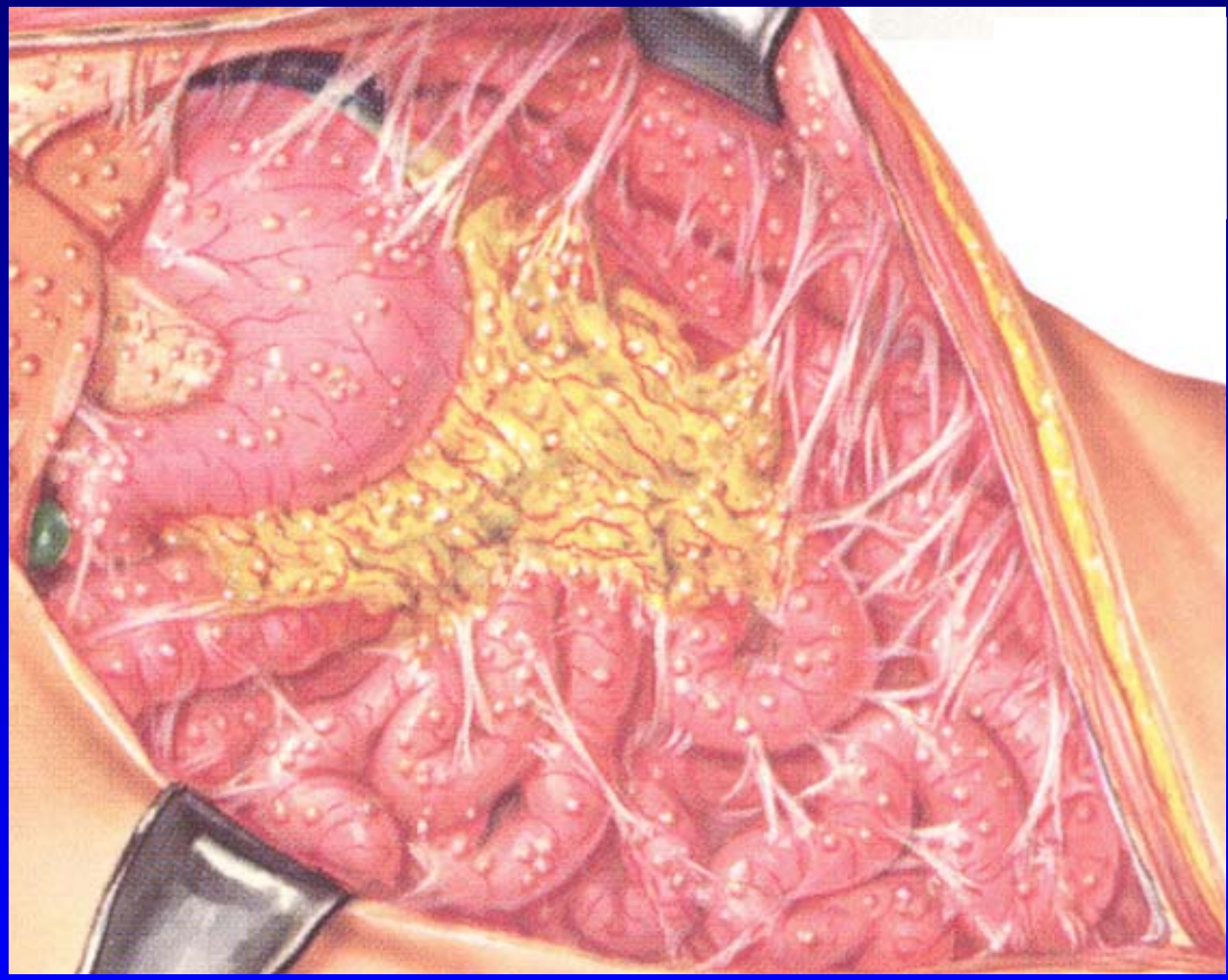
lymph nodes

liver

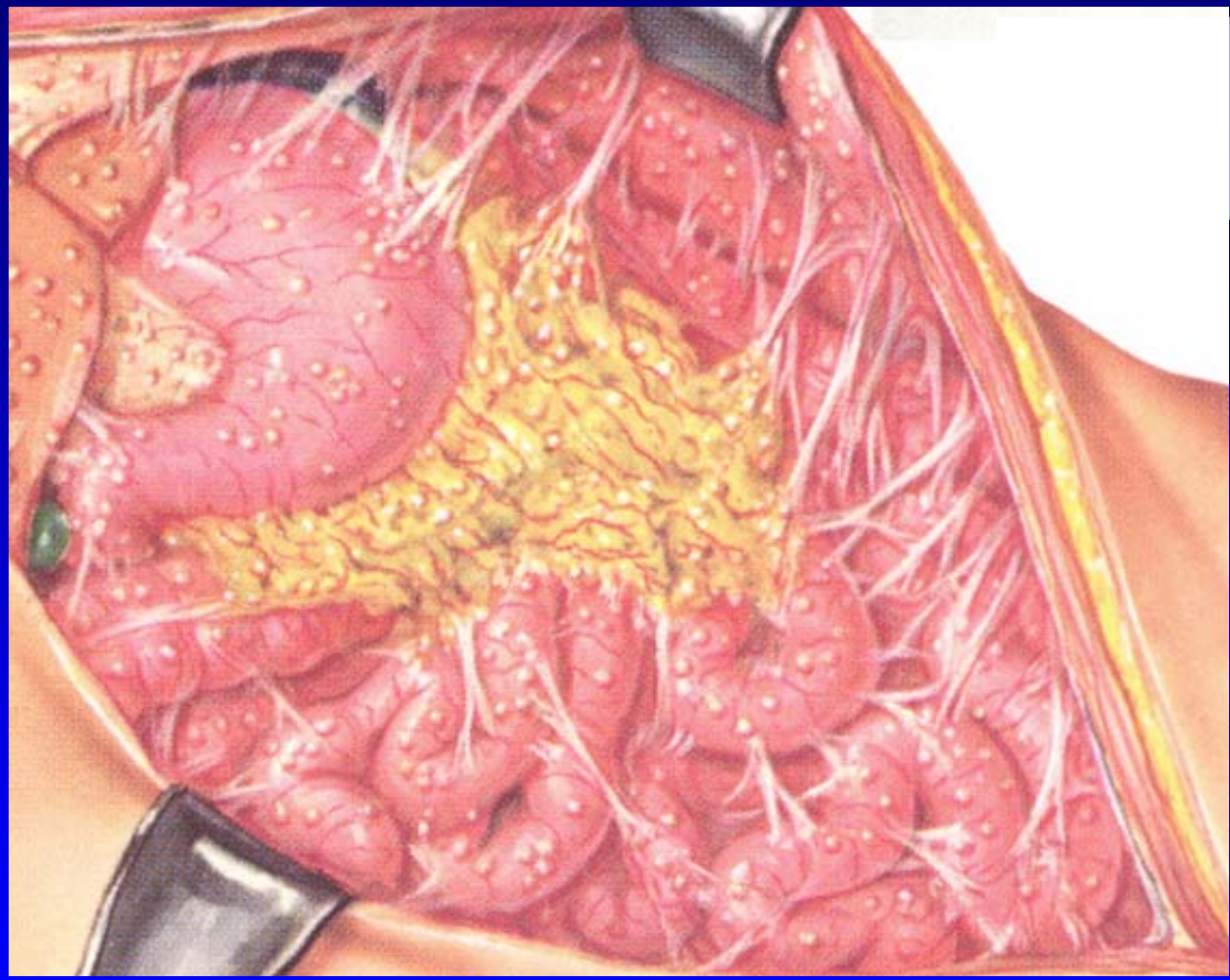
peritoneum



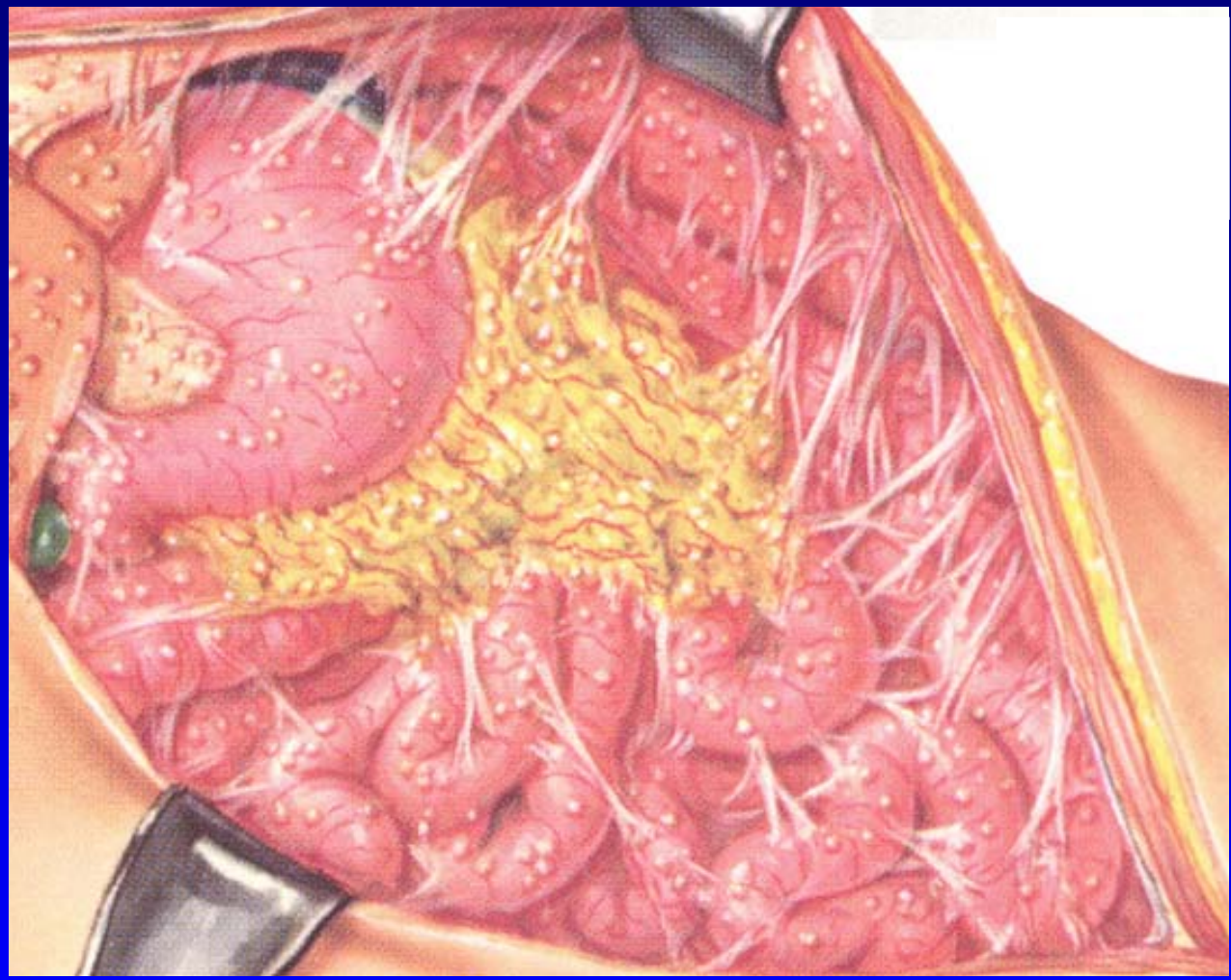
colon cancer



peritoneal carcinomatosis



→ obstruction



→ death

peritoneal carcinomatosis: treatment

<u>up until recently:</u>

- ‘incurable’
- mean survival 6-8 months
- chemotherapy

  ± minimal palliative surgery

Glehen, J Clin Oncol 2004

peritoneal carcinomatosis: treatment

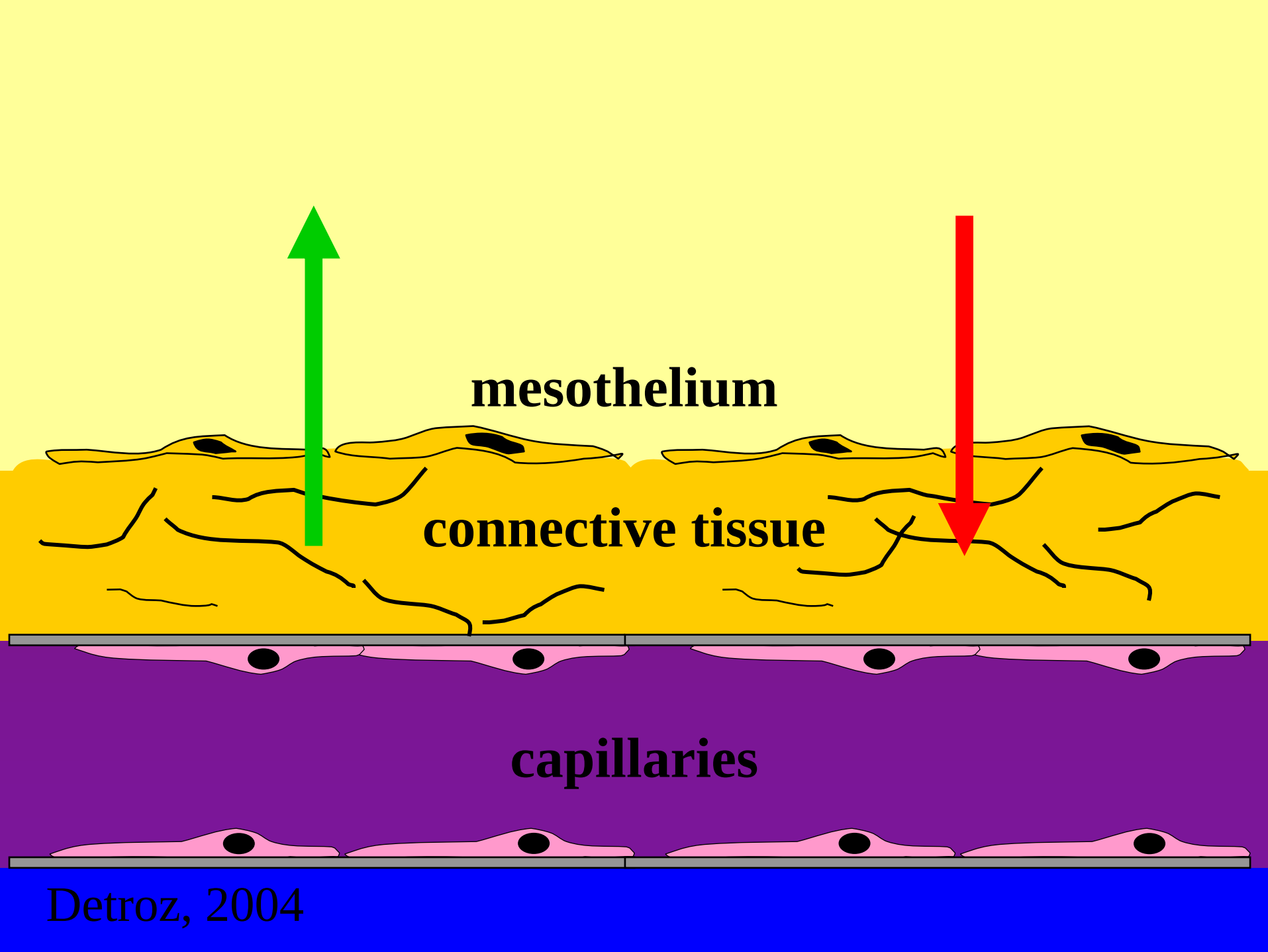
since September 2003:

- HIPEC
- significantly improves survival
- allows cure in some patients

Verwaal, J Clin Oncol 2003

physiology of peritoneum

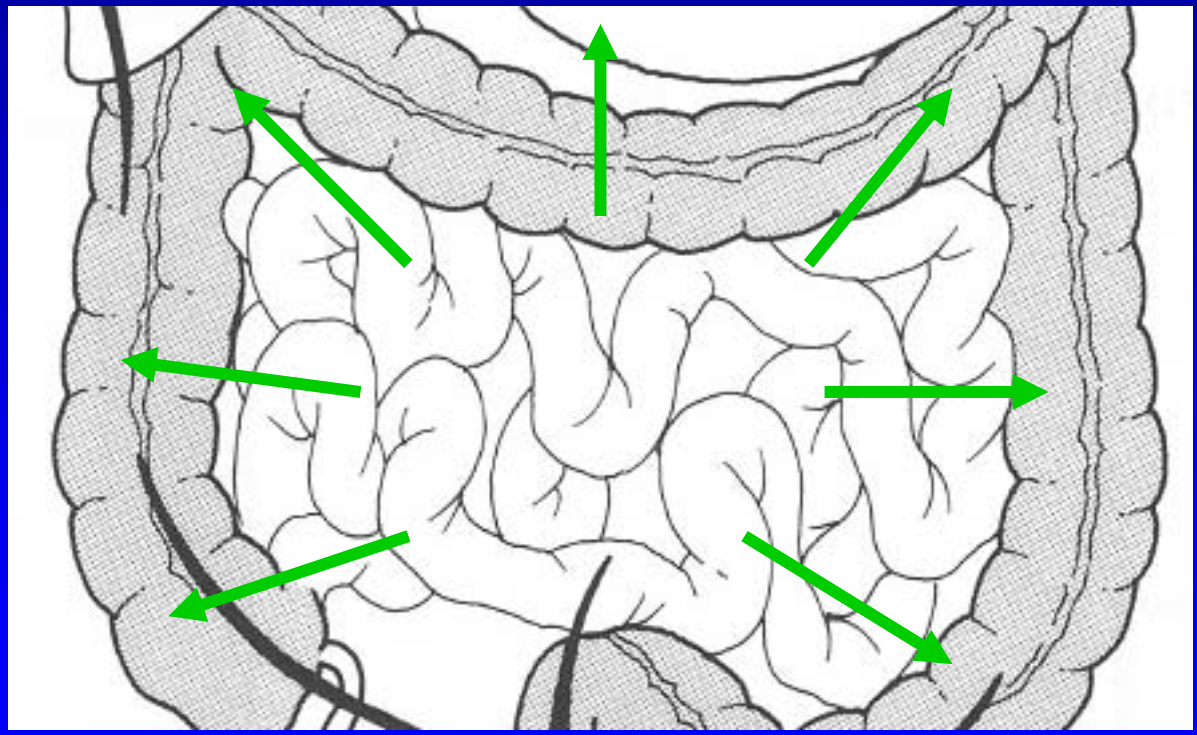
surface of 2 m^2



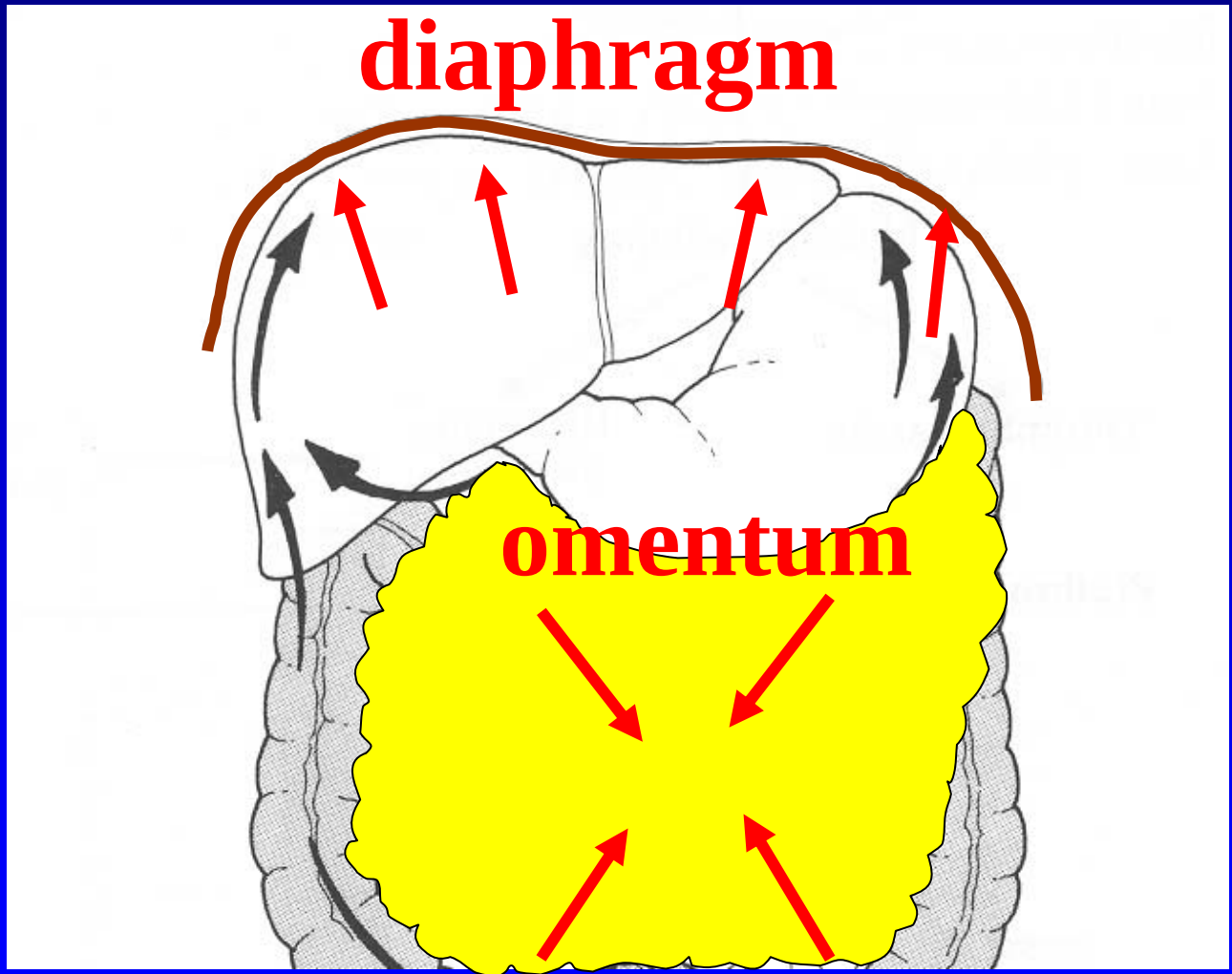
Detroz, 2004

peritoneum: secretion

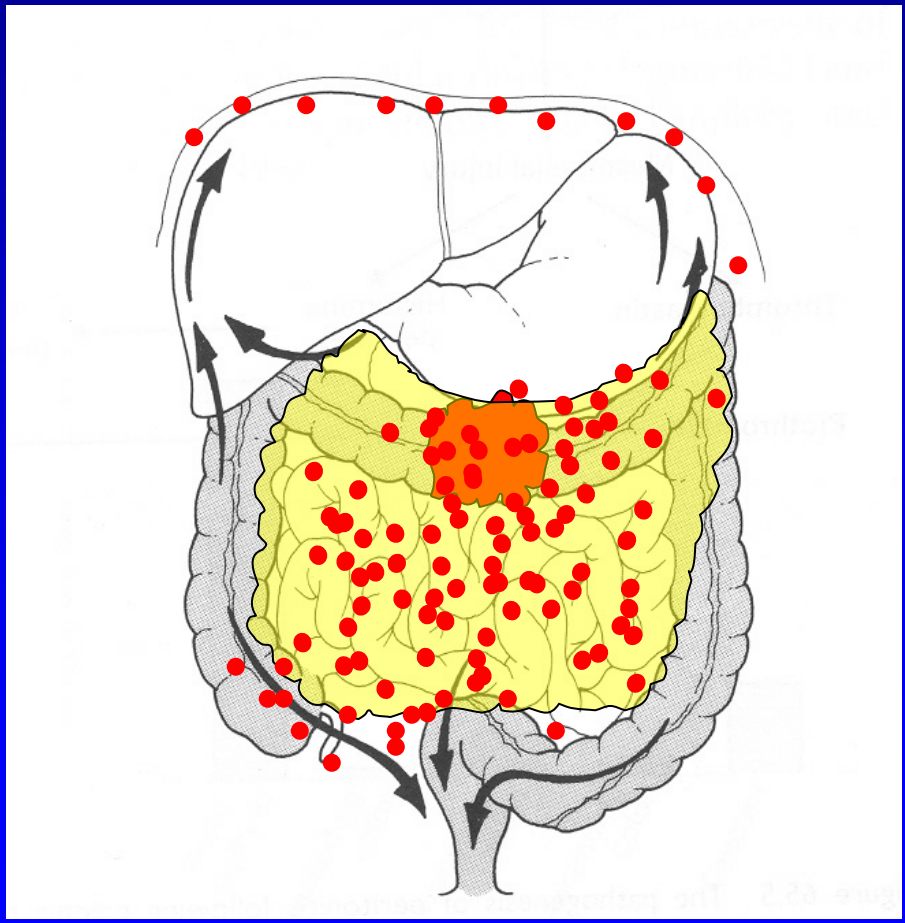
small bowel

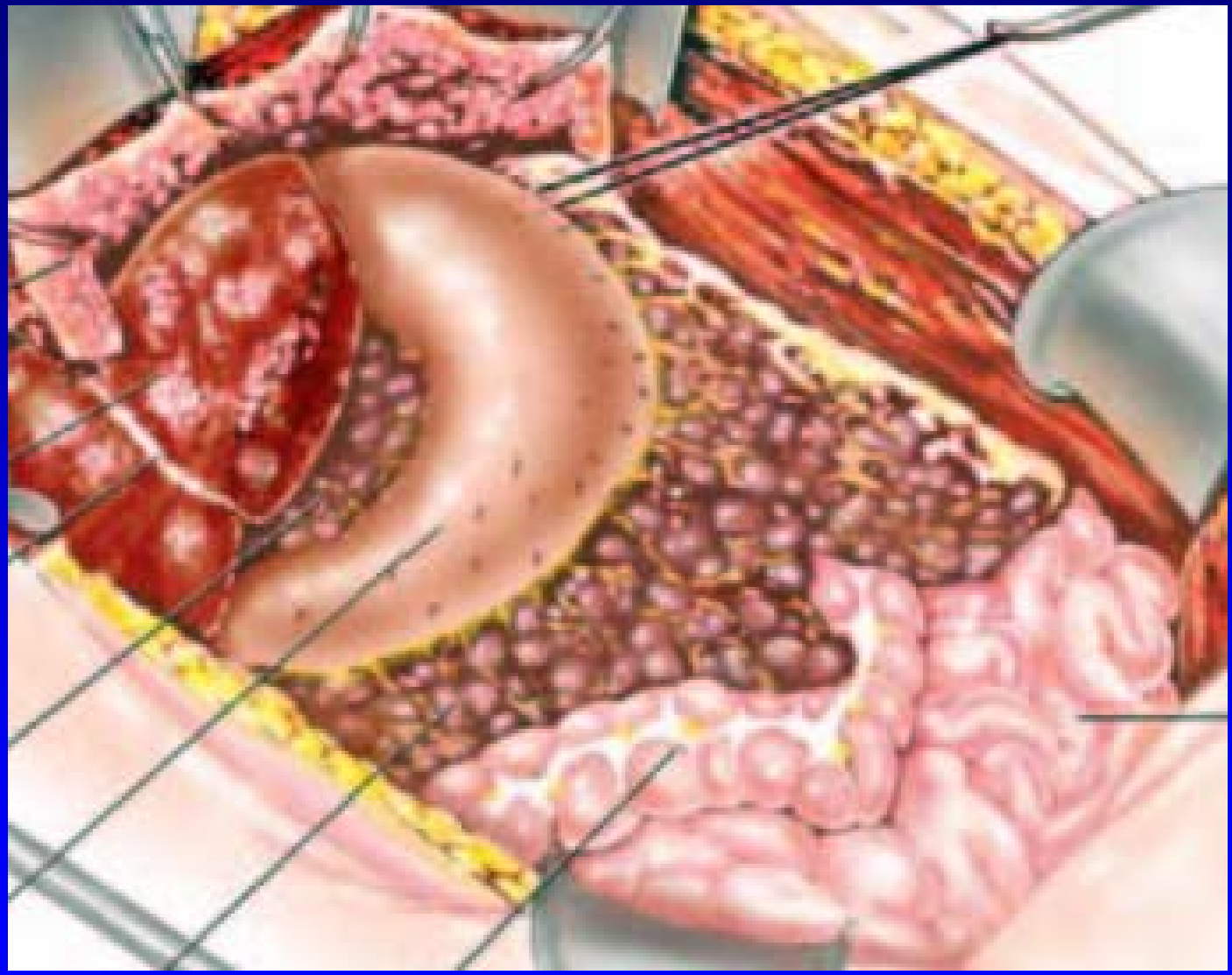


peritoneum:absorption



peritoneal carcinomatosis: distribution of nodules





Sugarbaker, Surg Clin N Am 2003

HIPEC:

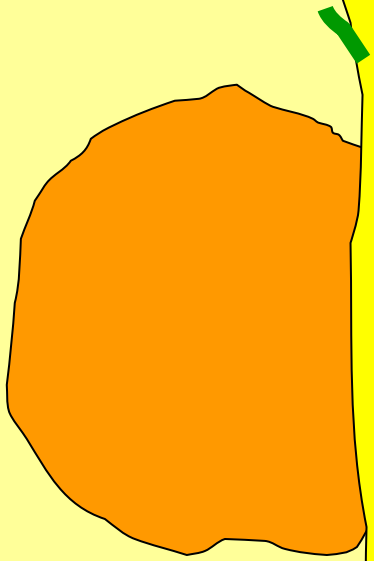
1. cytoreduction

   macroscopic tumour

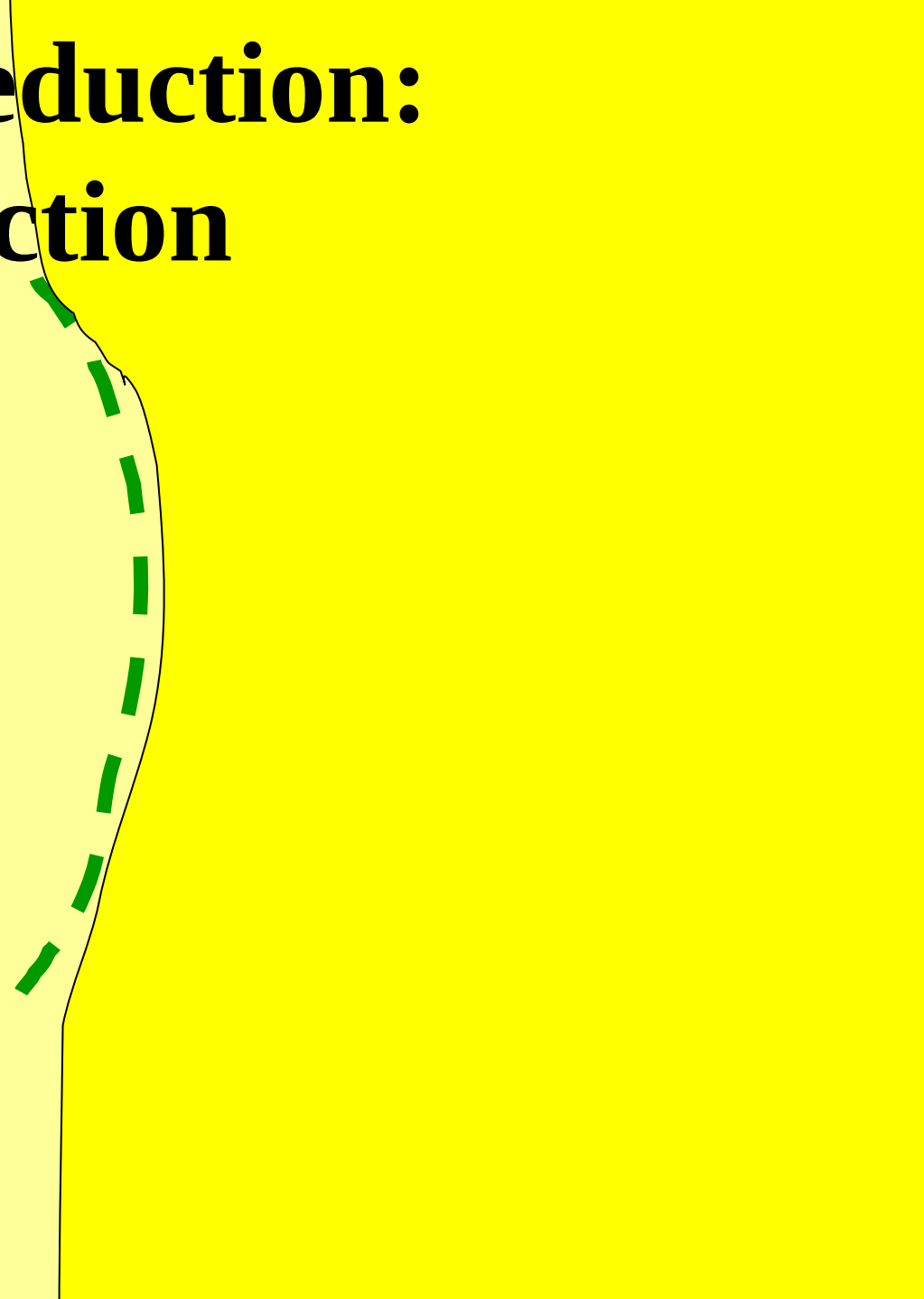
2. intraperitoneal chemotherapy

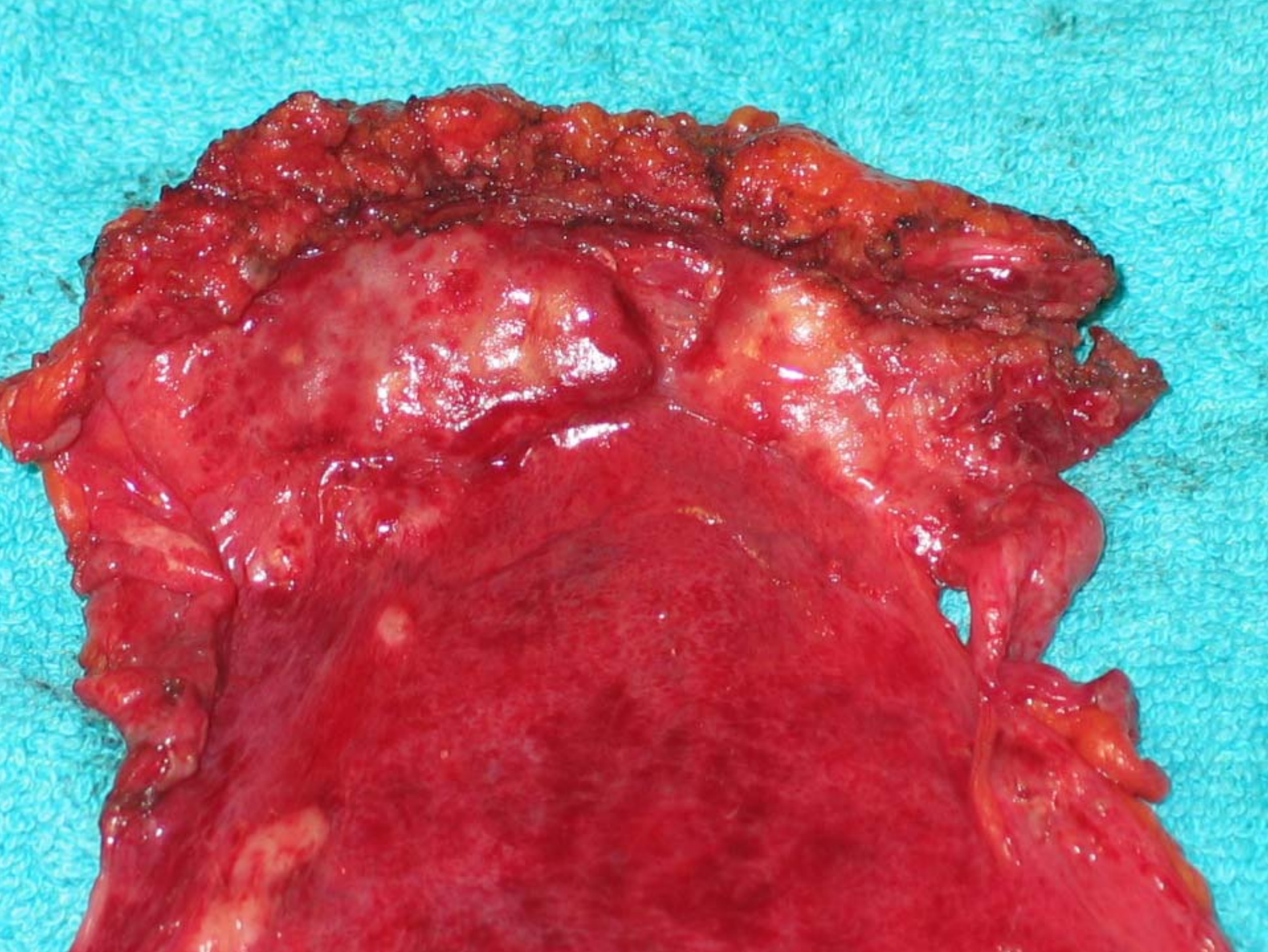
   microscopic tumour

1. cytoreduction: resection

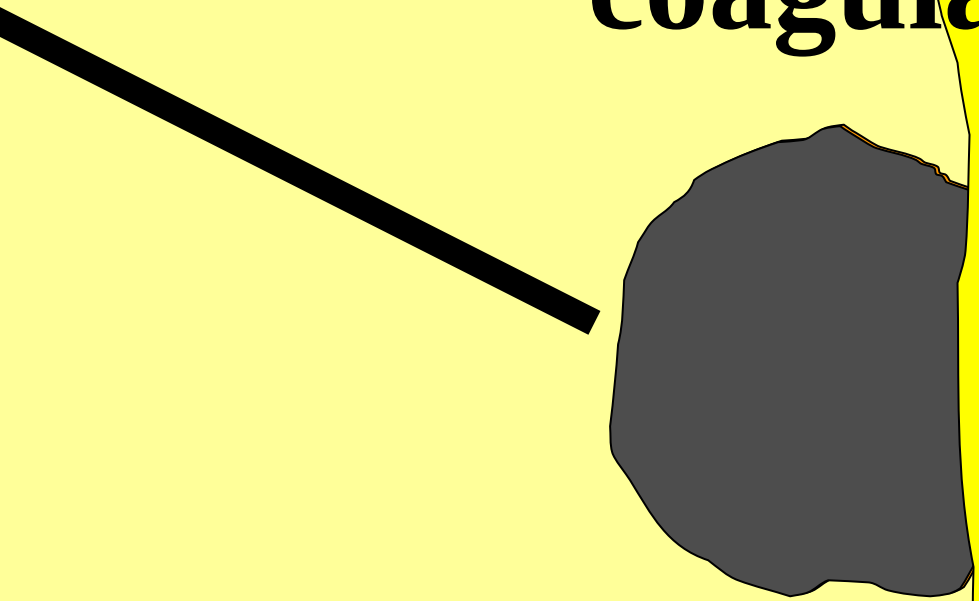


1. cytoreduction: resection





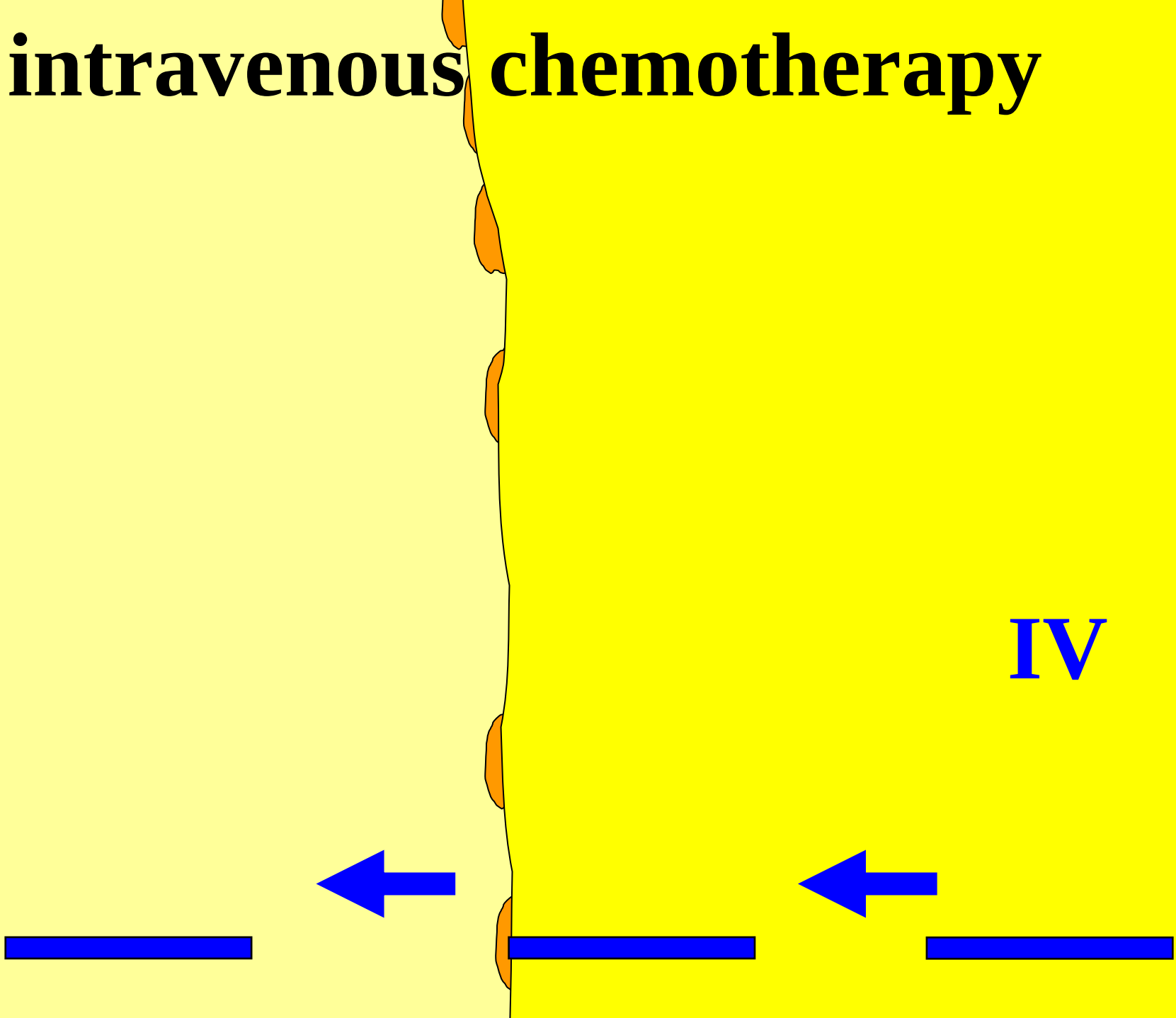
1. cytoreduction: coagulation



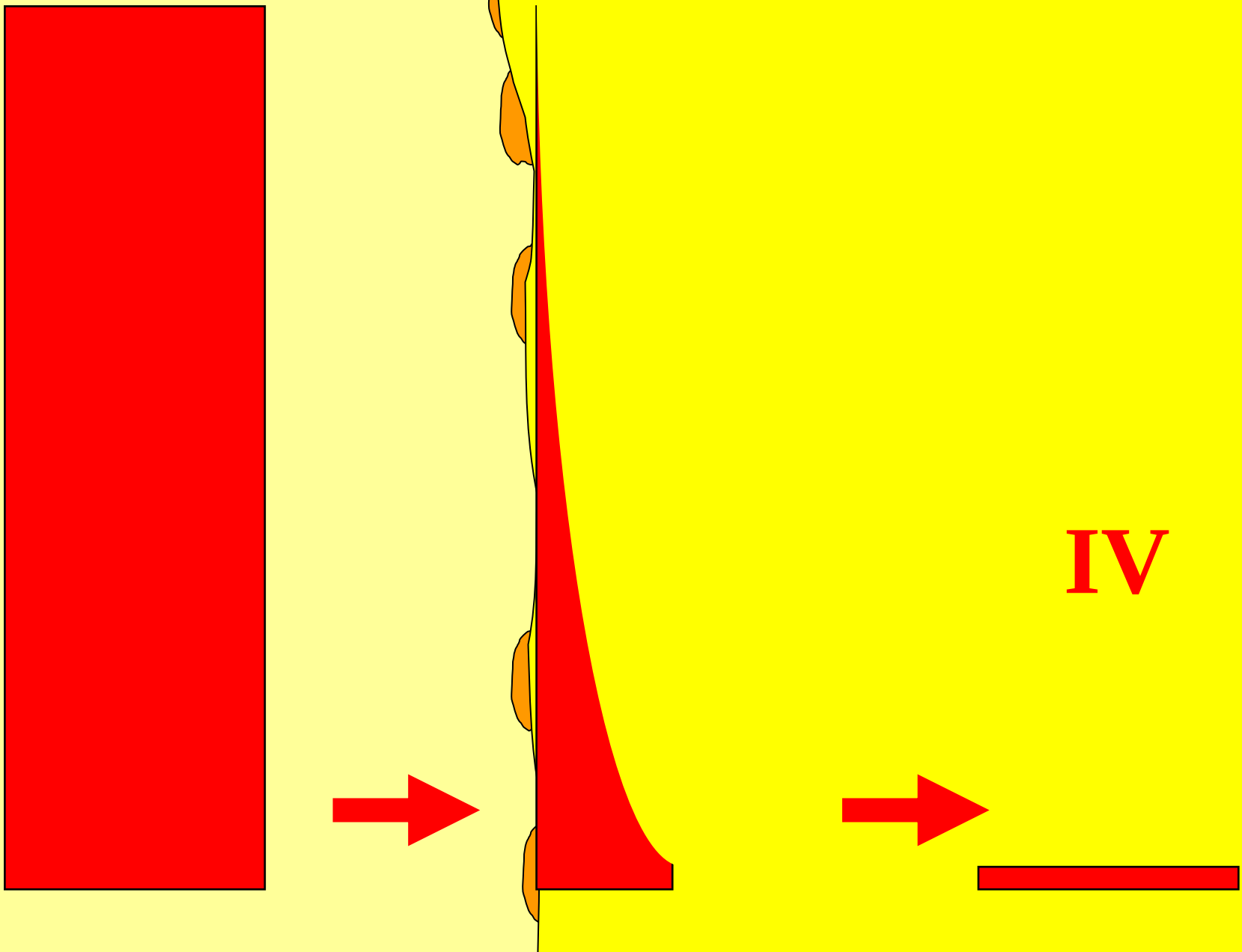
Detroz, 2004

Detroz, 2004

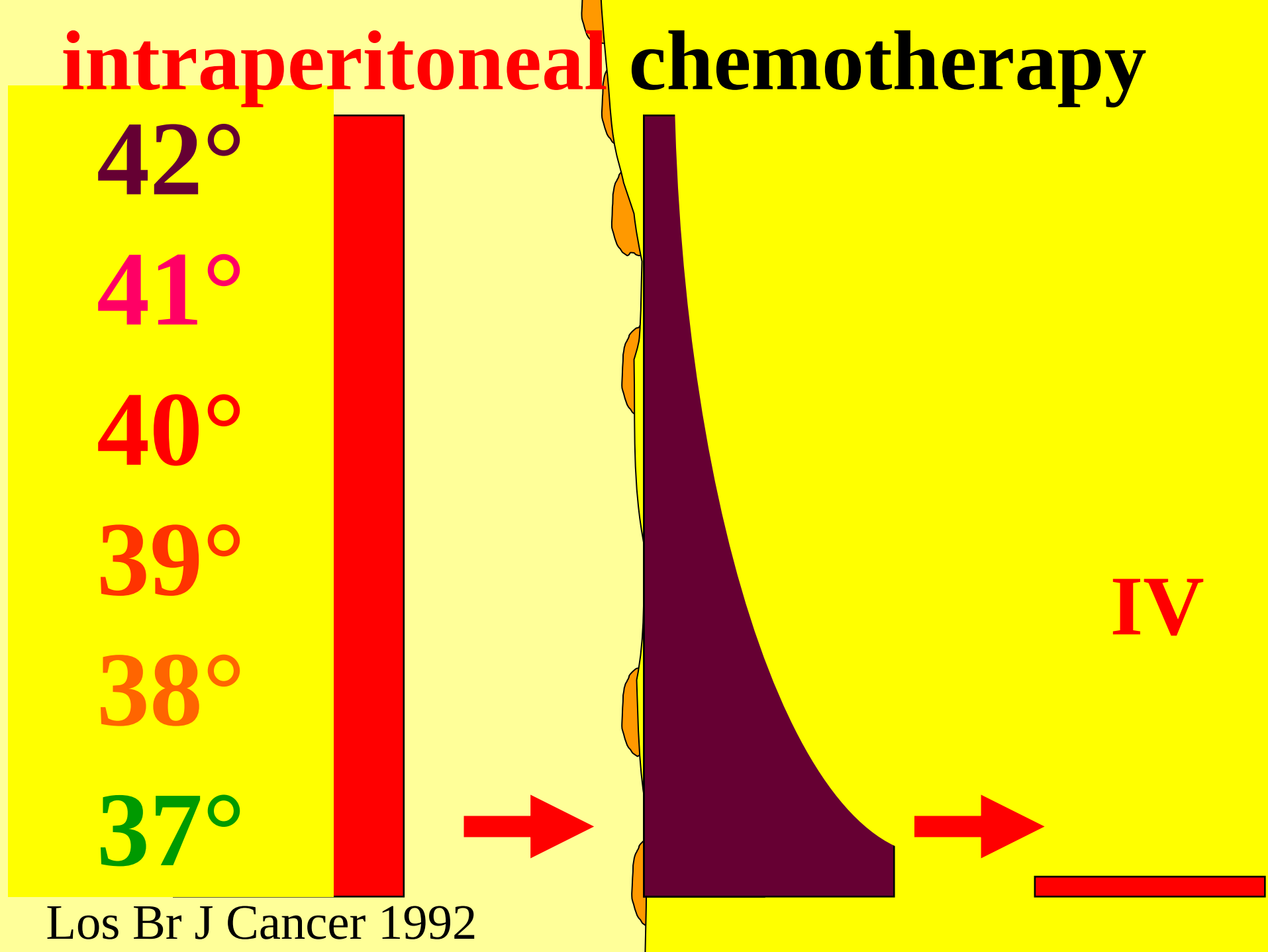
intravenous chemotherapy



intraperitoneal chemotherapy

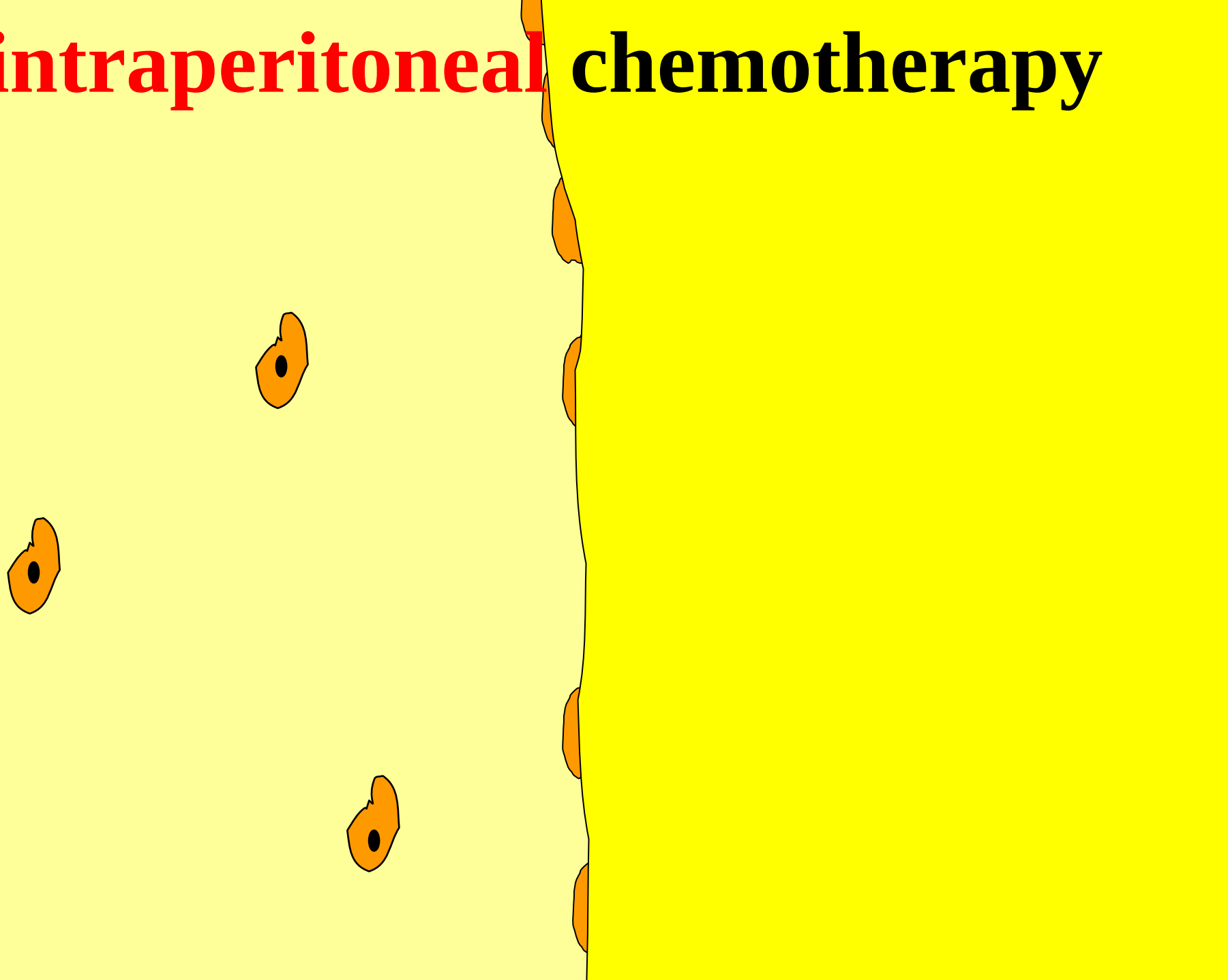


intraperitoneal chemotherapy

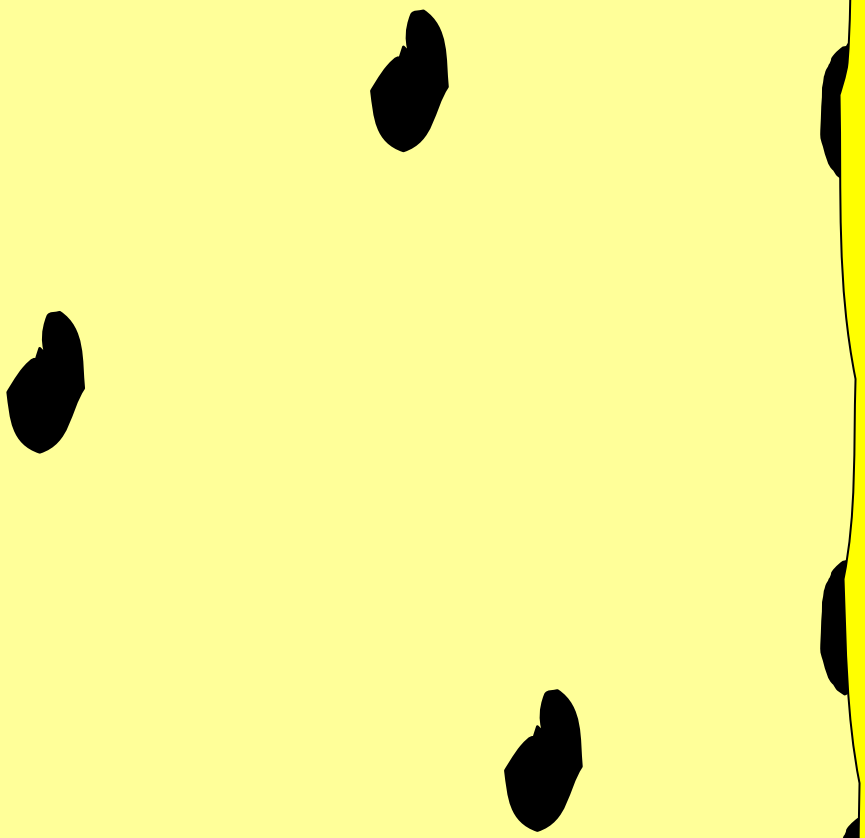


Los Br J Cancer 1992

intraperitoneal chemotherapy



intraperitoneal chemotherapy



synergy

-cytoreduction:

does not treat microscopic remnants

-intraperitoneal chemotherapy:

inefficient if macroscopic remants

hyperthermic intraperitoneal chemotherapy:

features of ideal drug

- limited systemic absorbtion
- quick systemic elimination
- immediate cytotoxic activity
- synergy with hyperthermia

hyperthermic intraperitoneal chemotherapy:

drugs

- colorectal cancer:
  - Mitomycin-C
  - oxaliplatin

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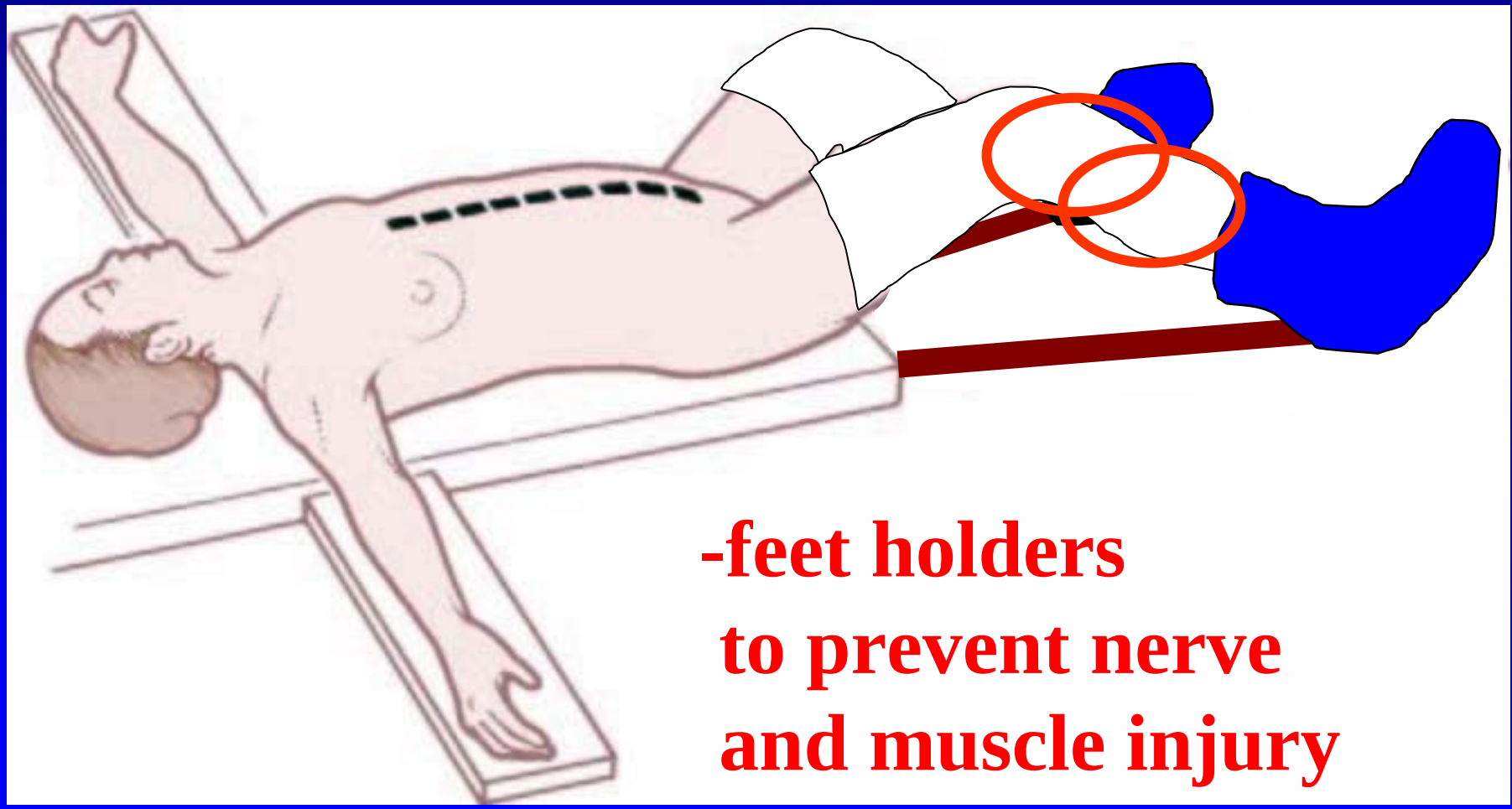
Cytoreduction and HIPEC : technique

1. installation
2. exploration
3. cytoreduction
4. HIPEC
5. reconstruction
6. drains

Installation

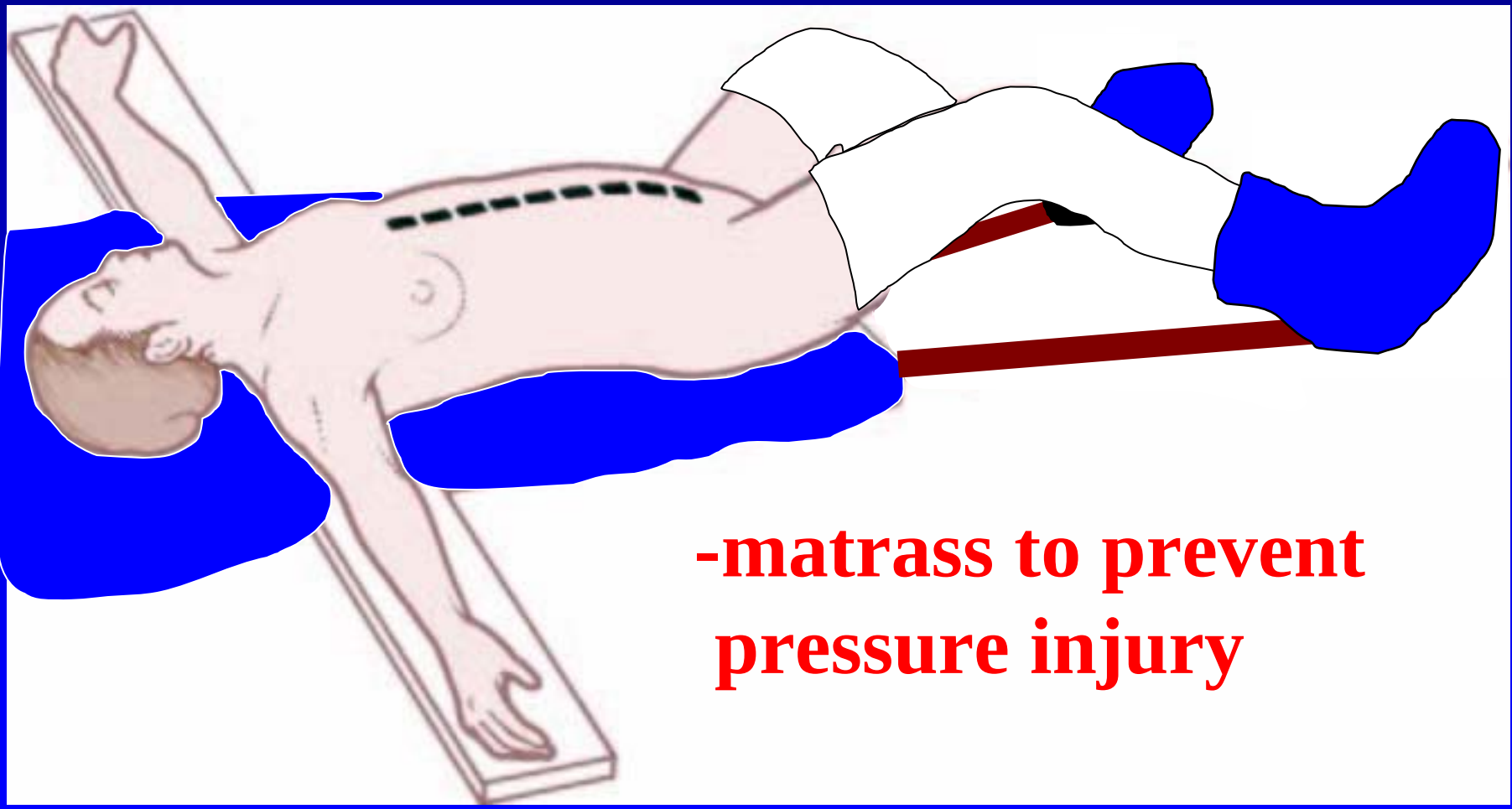
Installation

Installation



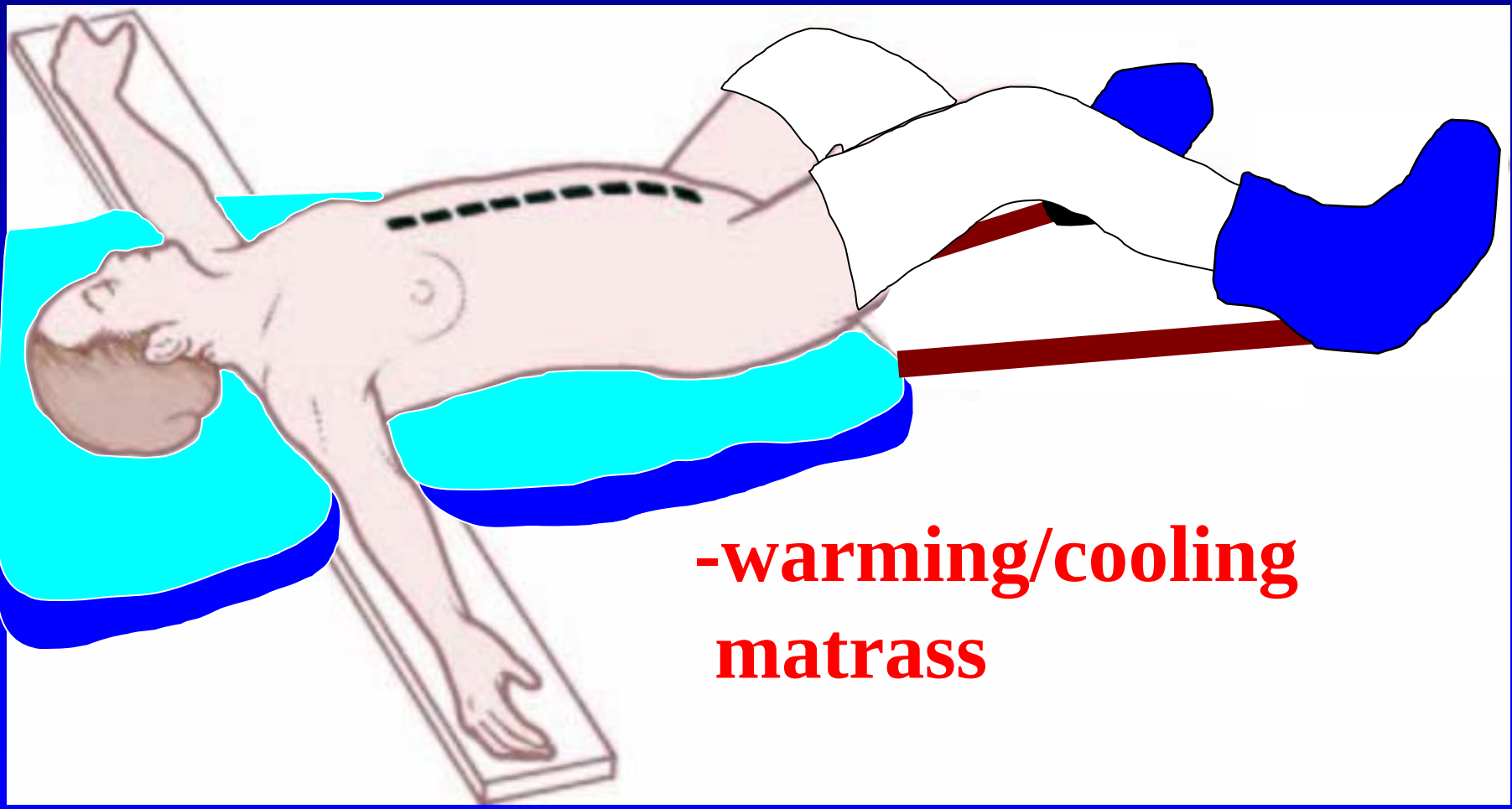
-feet holders
to prevent nerve
and muscle injury

Installation

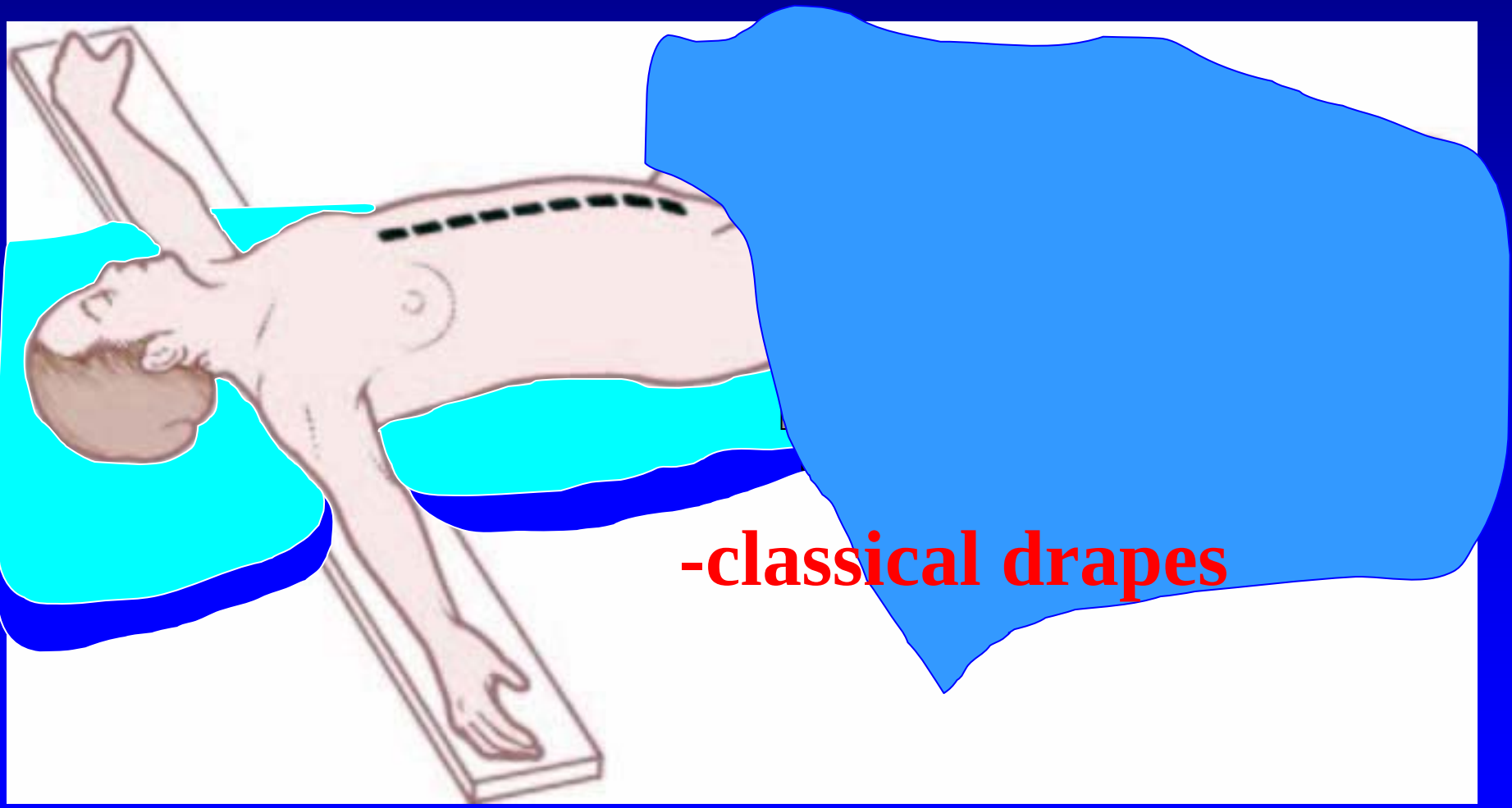


-matrass to prevent pressure injury

Installation

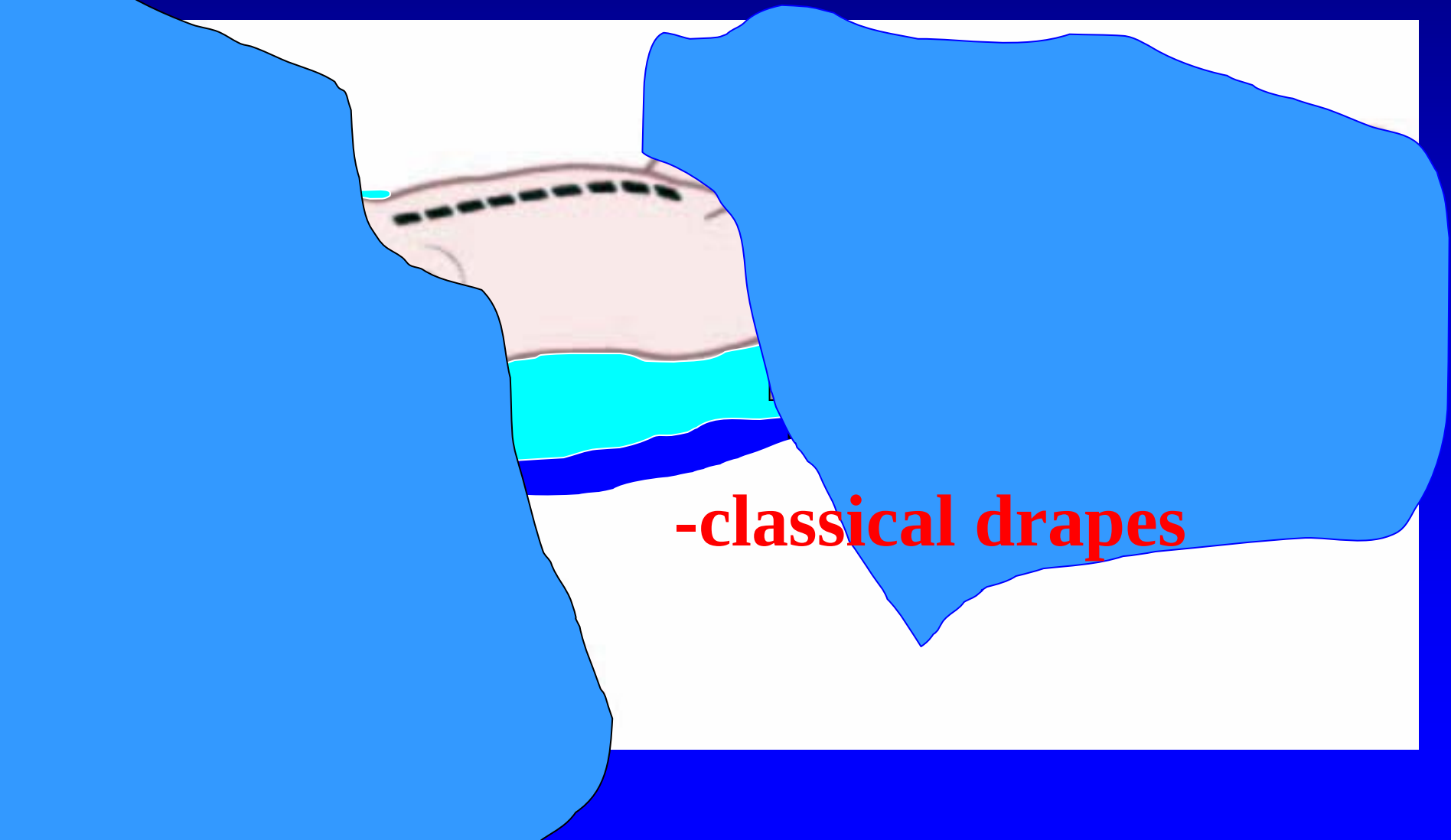


Installation

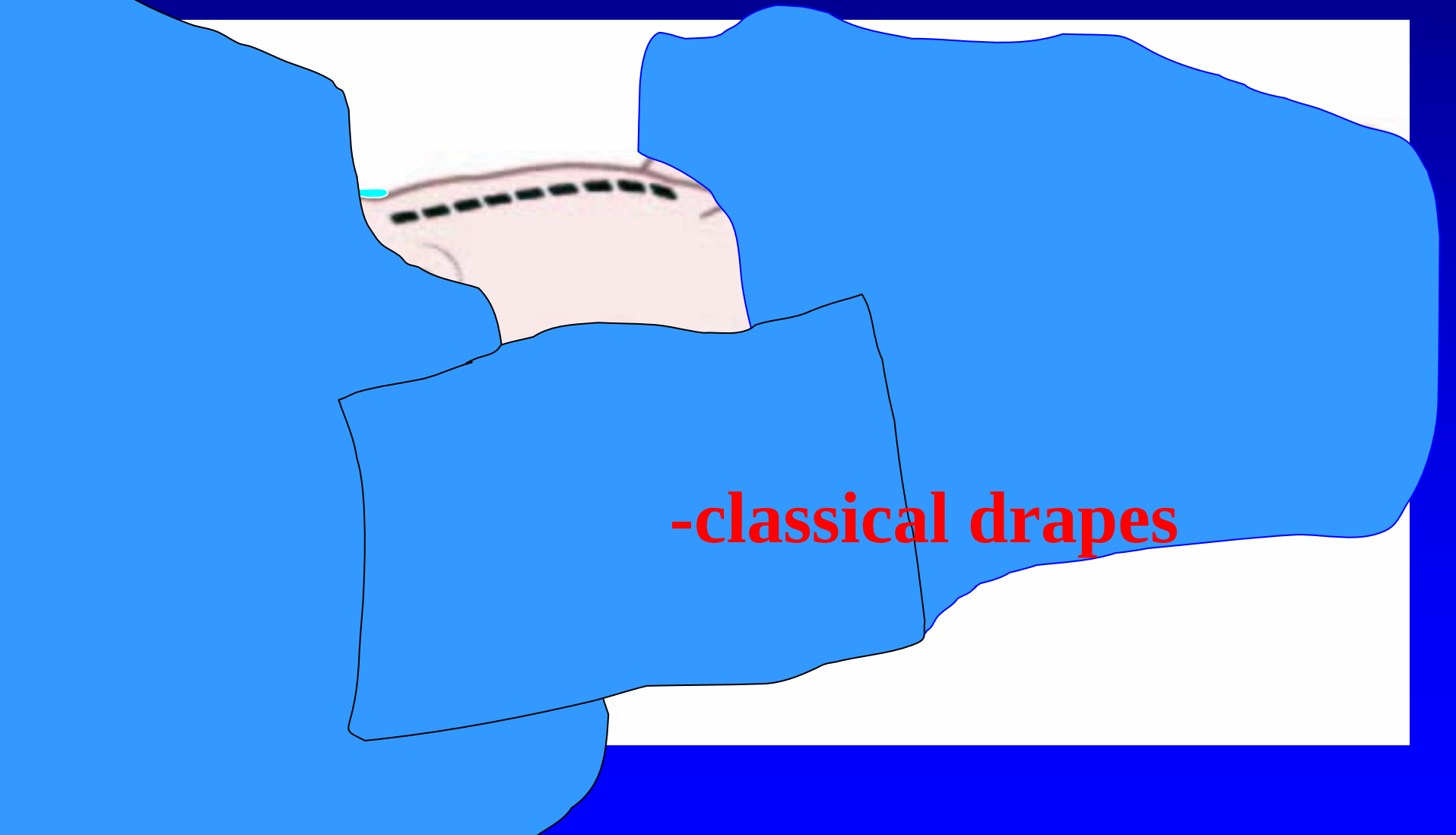


-classical drapes

Installation

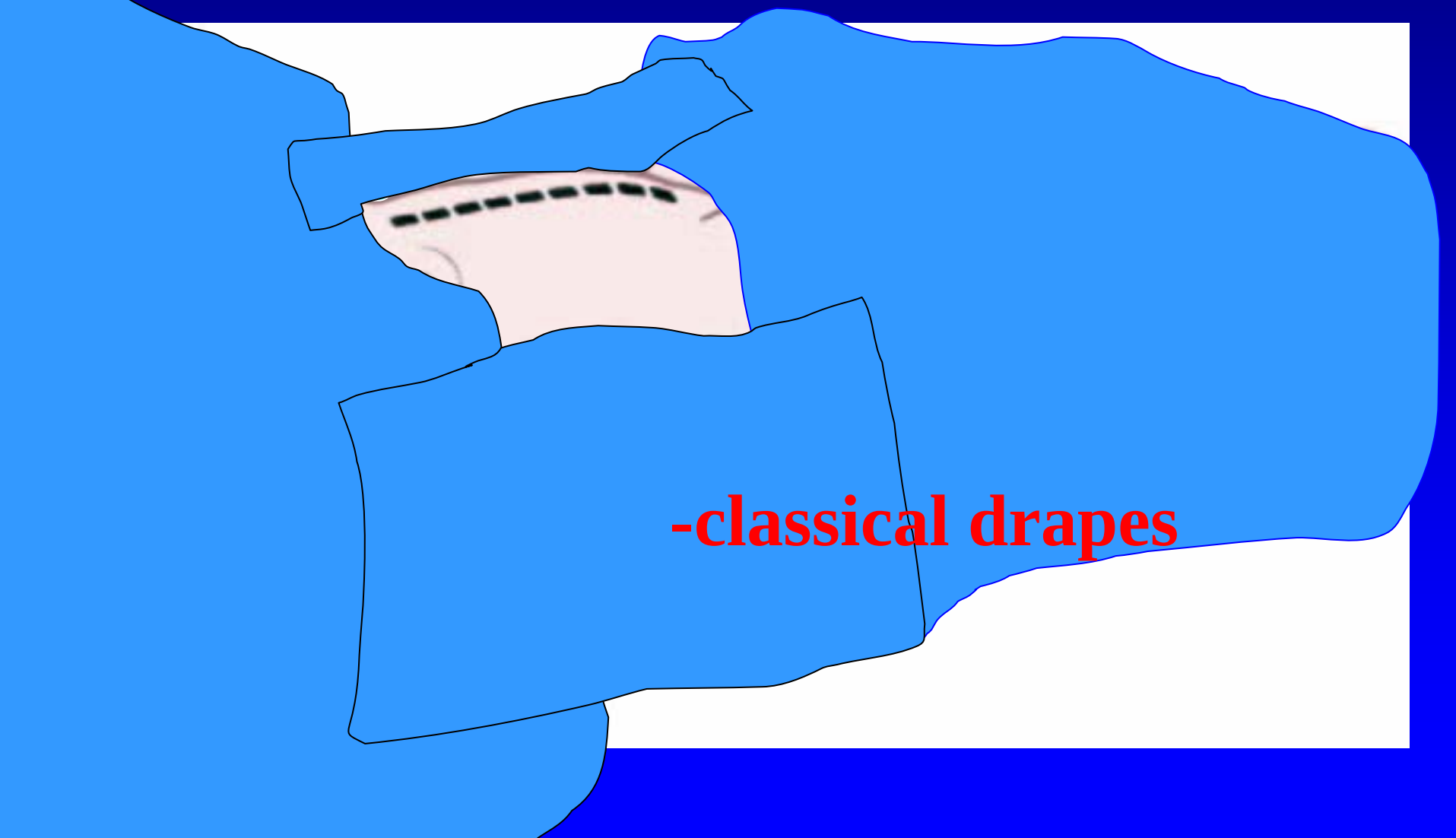


Installation



-classical drapes

Installation



-classical drapes


-caesarian section
drape

Cytoreduction and HIPEC : technique

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4. HIPEC
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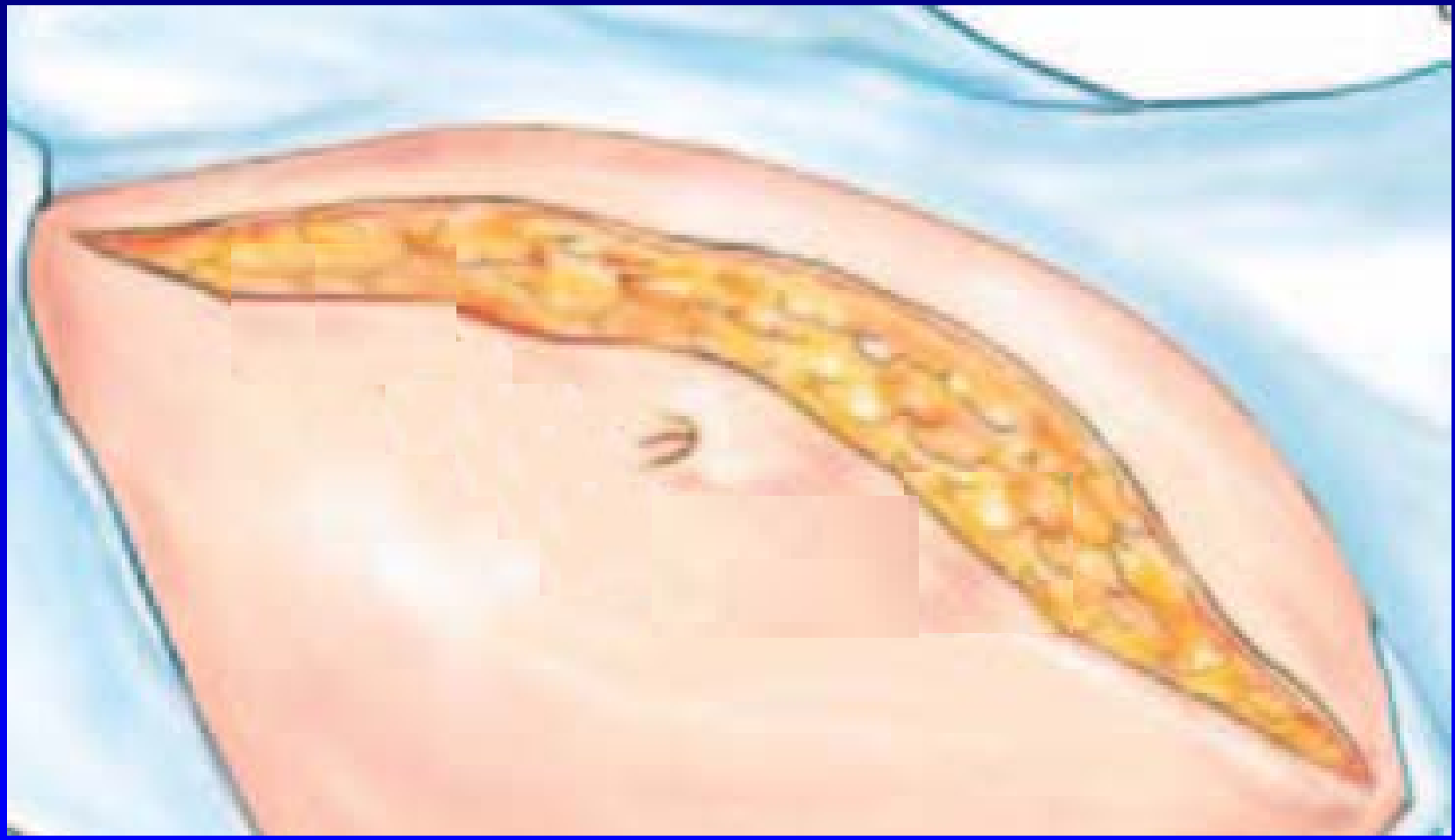
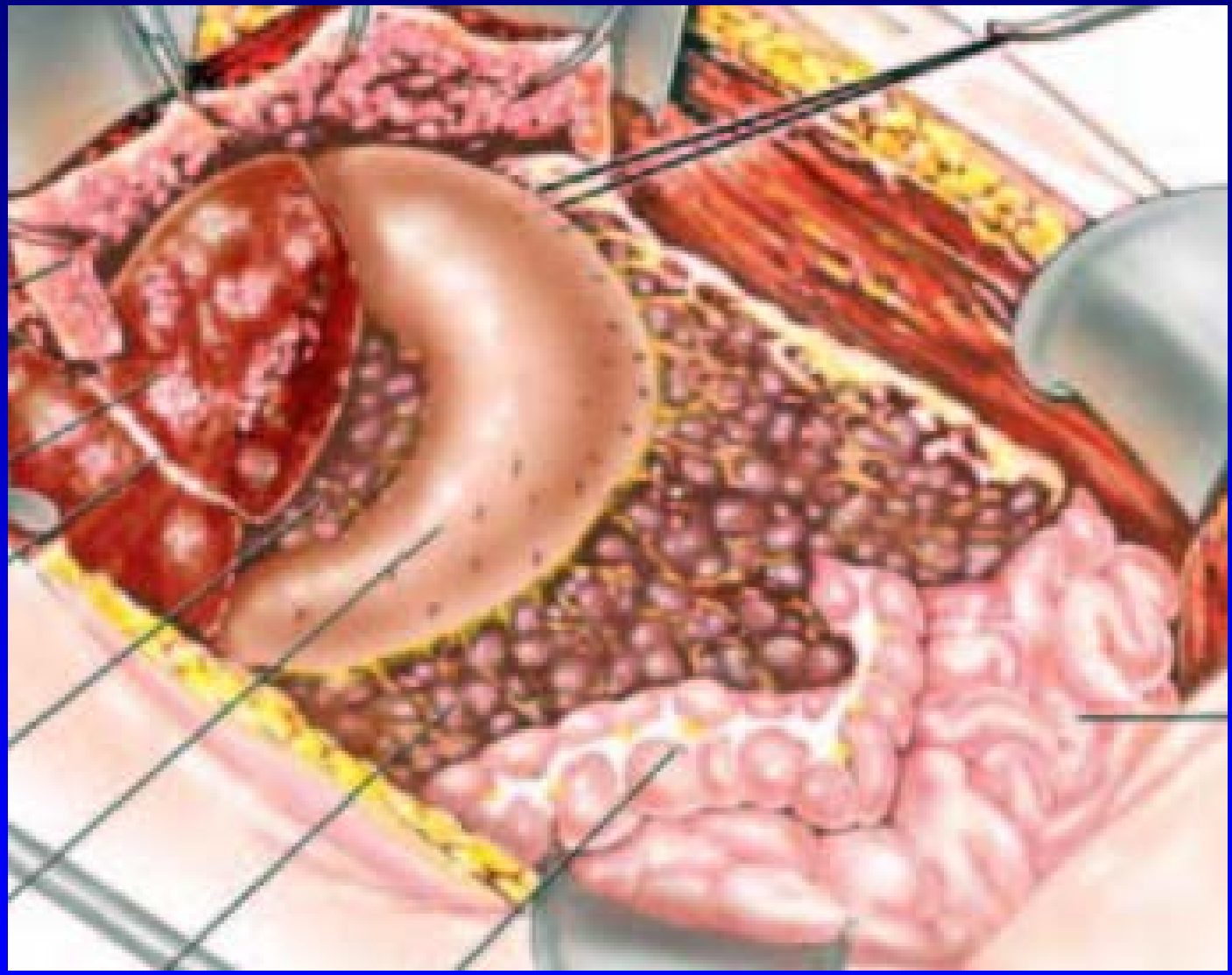
xyphopubic incision



Sugarbaker, Surg Clin N Am 2003

exploration



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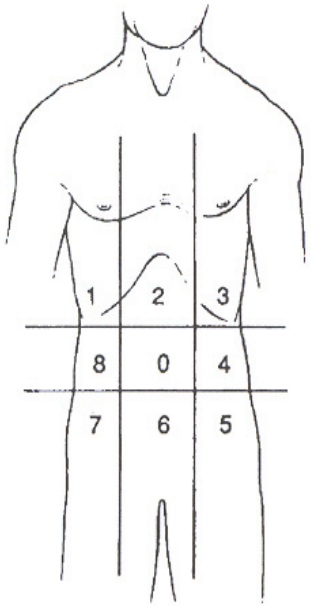
1. Extension?

Peritoneal Cancer Index

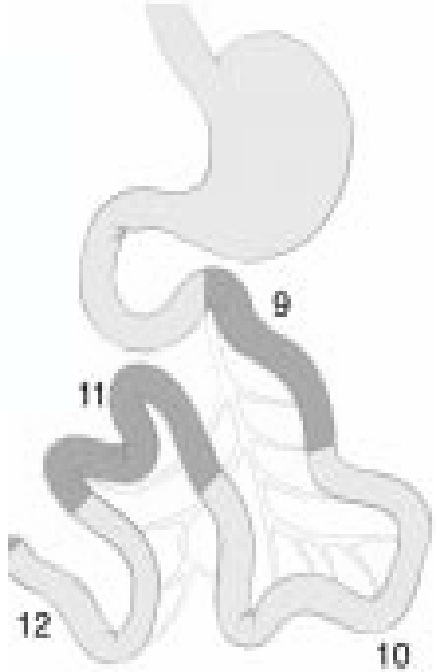


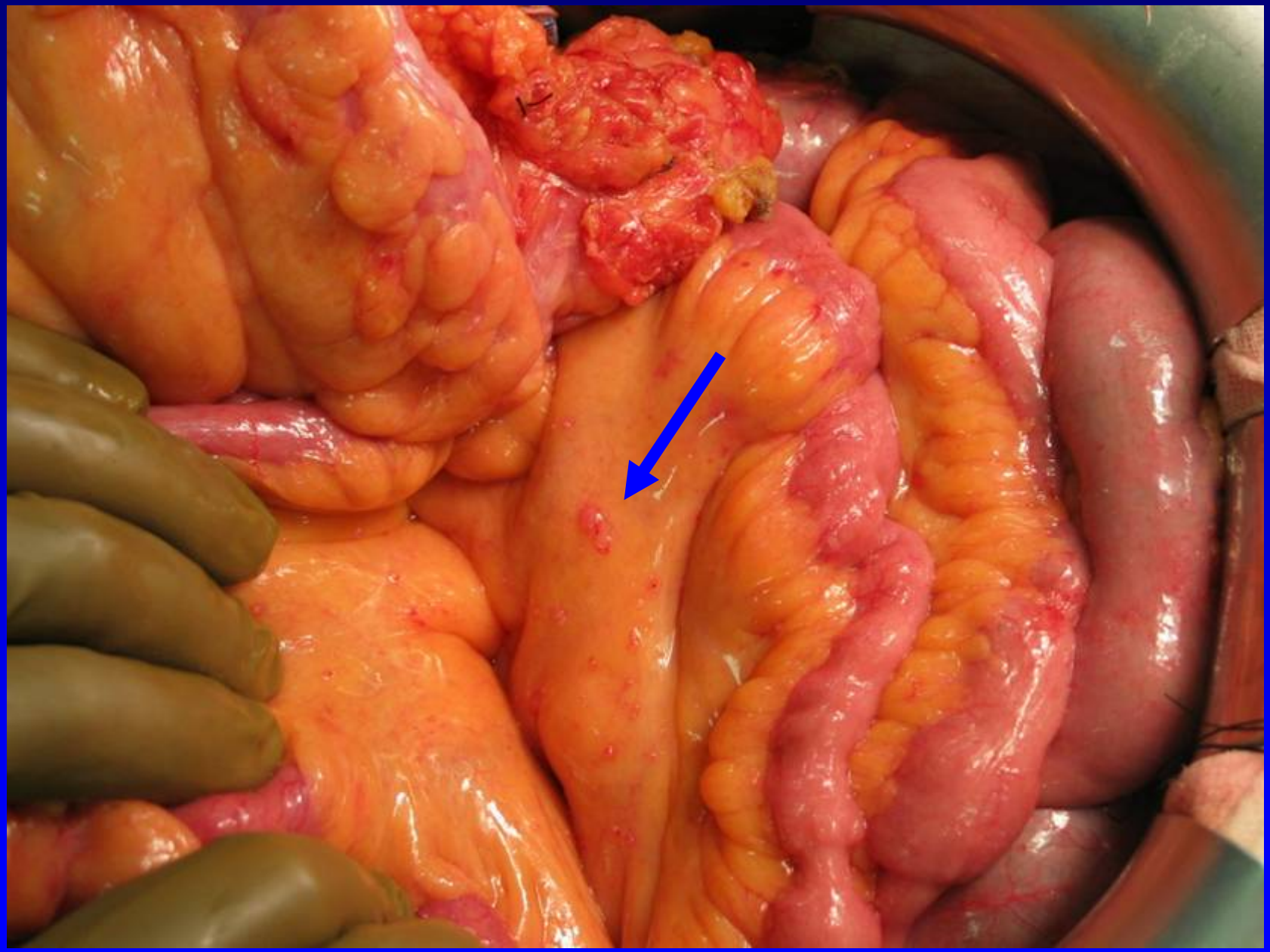
Regions	Lesion Size
0 Central	____
1 Right Upper	____
2 Epigastrium	____
3 Left Upper	____
4 Left Flank	____
5 Left Lower	____
6 Pelvis	____
7 Right Lower	____
8 Right Flank	____
9 Upper Jejunum	____
10 Lower Jejunum	____
11 Upper Ileum	____
12 Lower Ileum	____

PCI ☐

Lesion Size Score

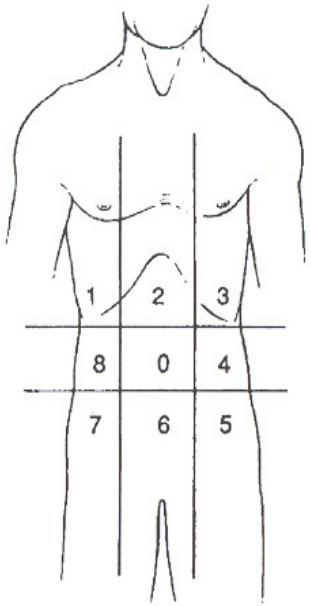
LS 0 No tumor seen
LS 1 Tumor up to 0.5
LS 2 Tumor up to 5.0
LS 3 Tumor > 5.0 cm





1. Extension?

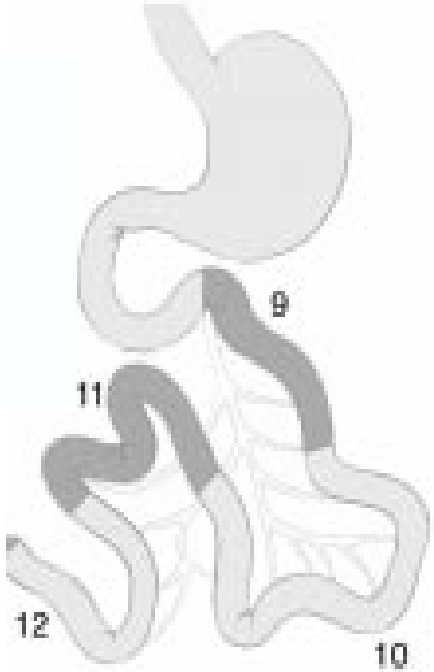
Peritoneal Cancer Index



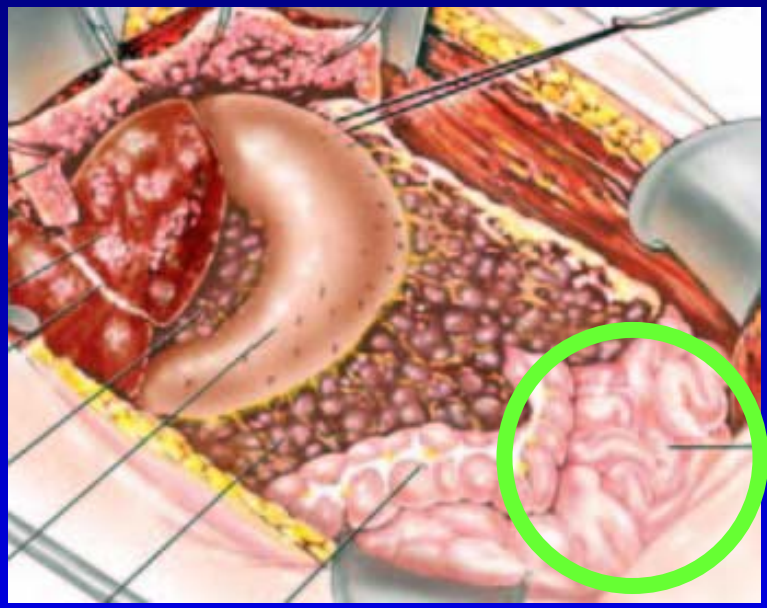
Regions	Lesion Size
0 Central	2
1 Right Upper	3
2 Epigastrium	0
3 Left Upper	1
4 Left Flank	1
5 Left Lower	0
6 Pelvis	0
7 Right Lower	2
8 Right Flank	0
9 Upper Jejunum	0
10 Lower Jejunum	3
11 Upper Ileum	1
12 Lower Ileum	3
PCI	**16**

Lesion Size Score

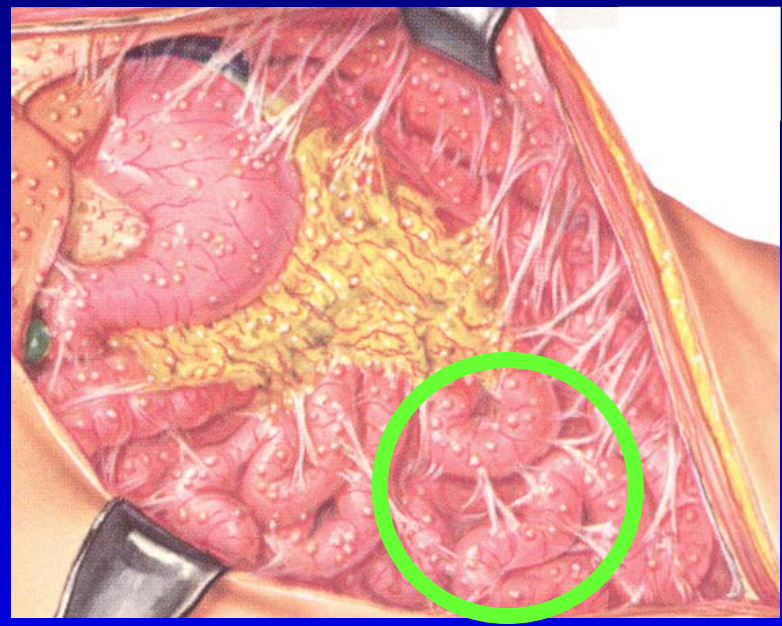
LS 0 No tumor seen
LS 1 Tumor up to 0.5
LS 2 Tumor up to 5.0
LS 3 Tumor > 5.0 cm



2. Complete resection possible? (1)



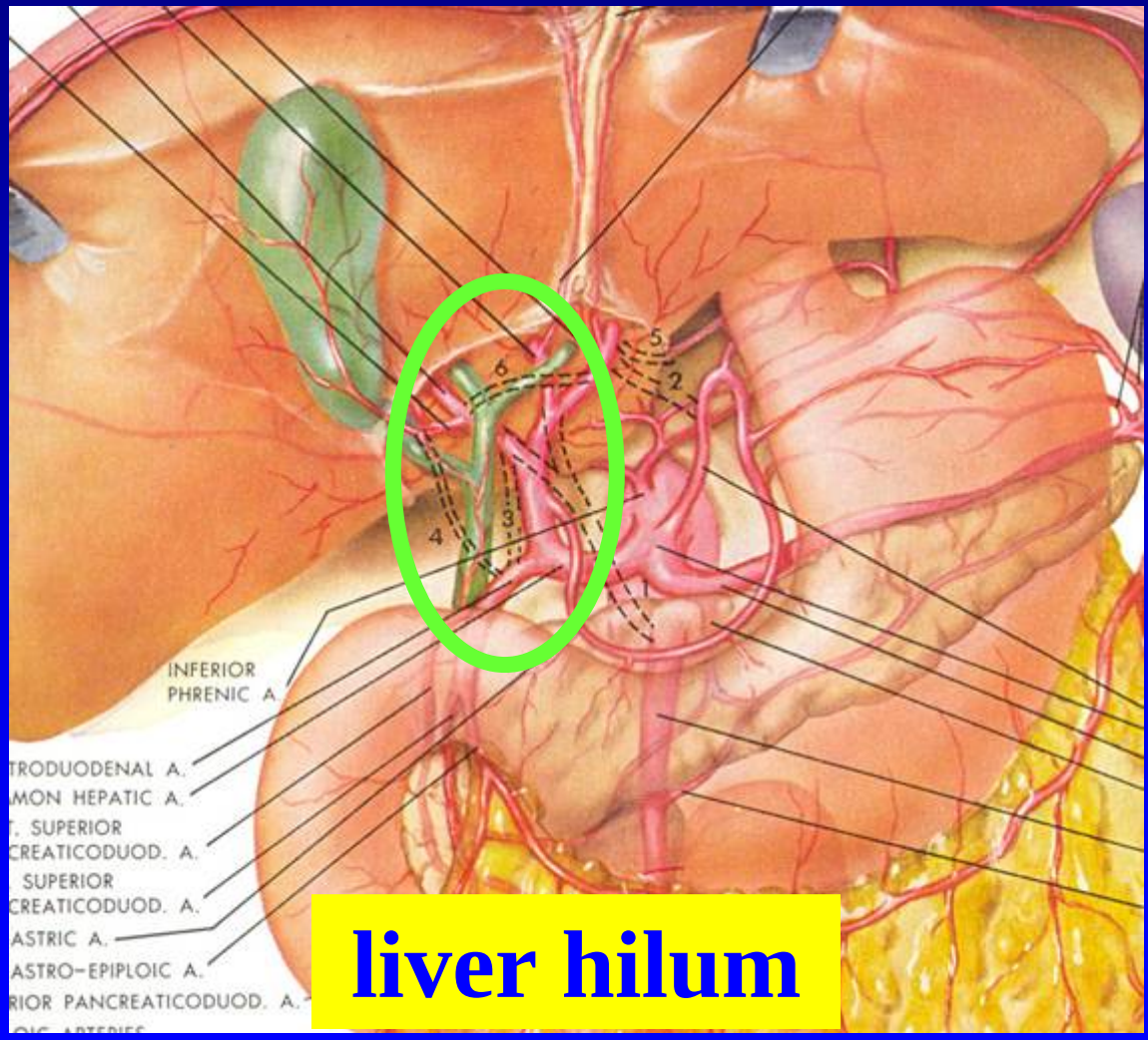
possible



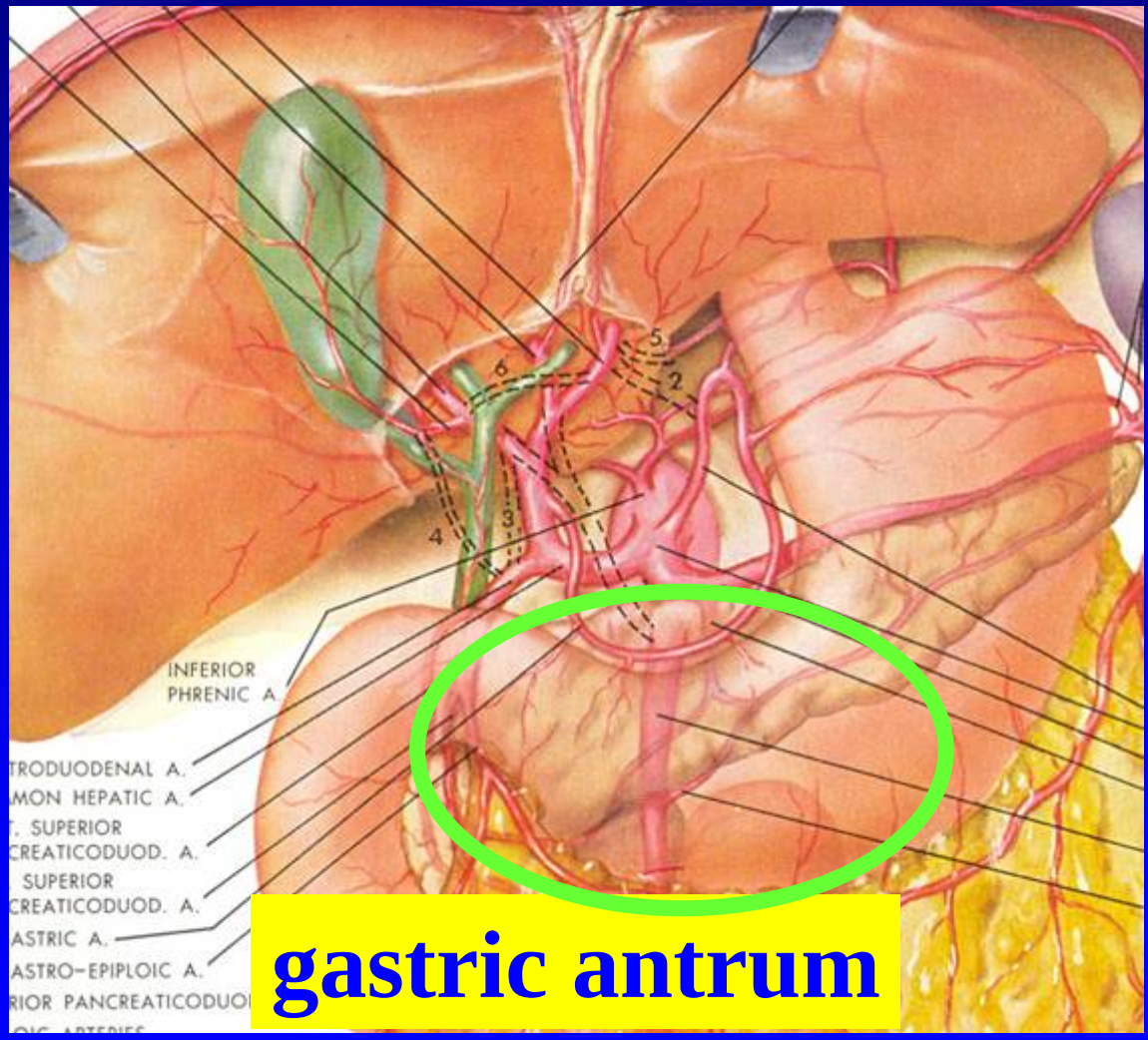
not possible

1.5 m residual small bowel

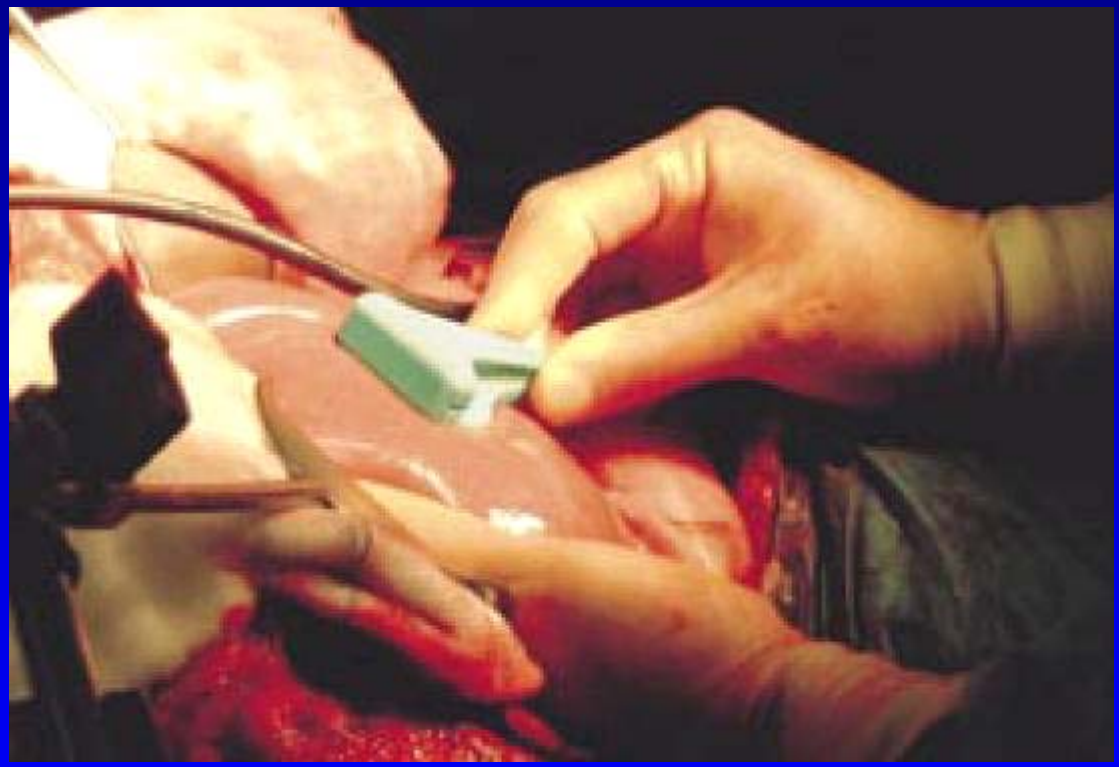
2. Complete resection possible? (2)

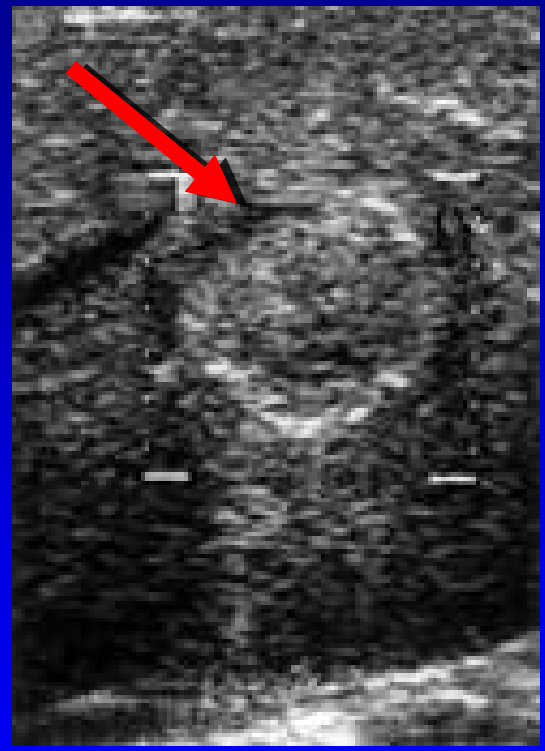


2. Complete resection possible? (3)



3. Liver metastases?





intraoperative ultrasound

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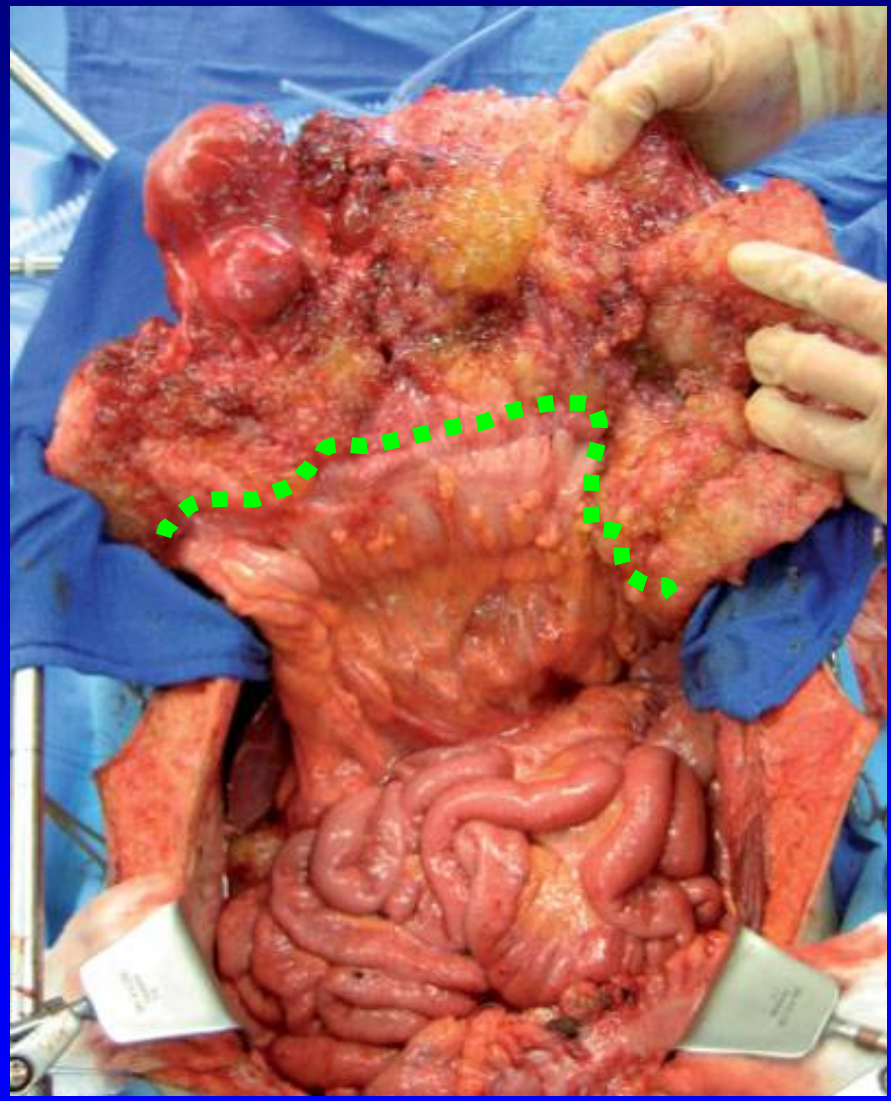
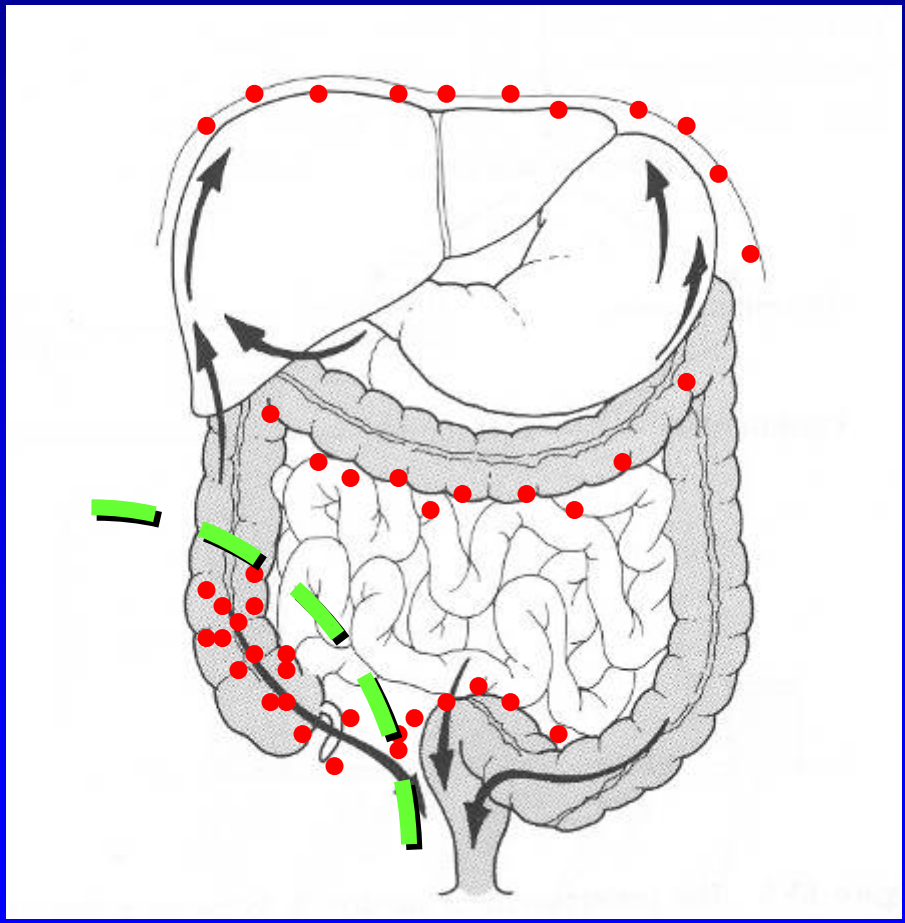
omental resection

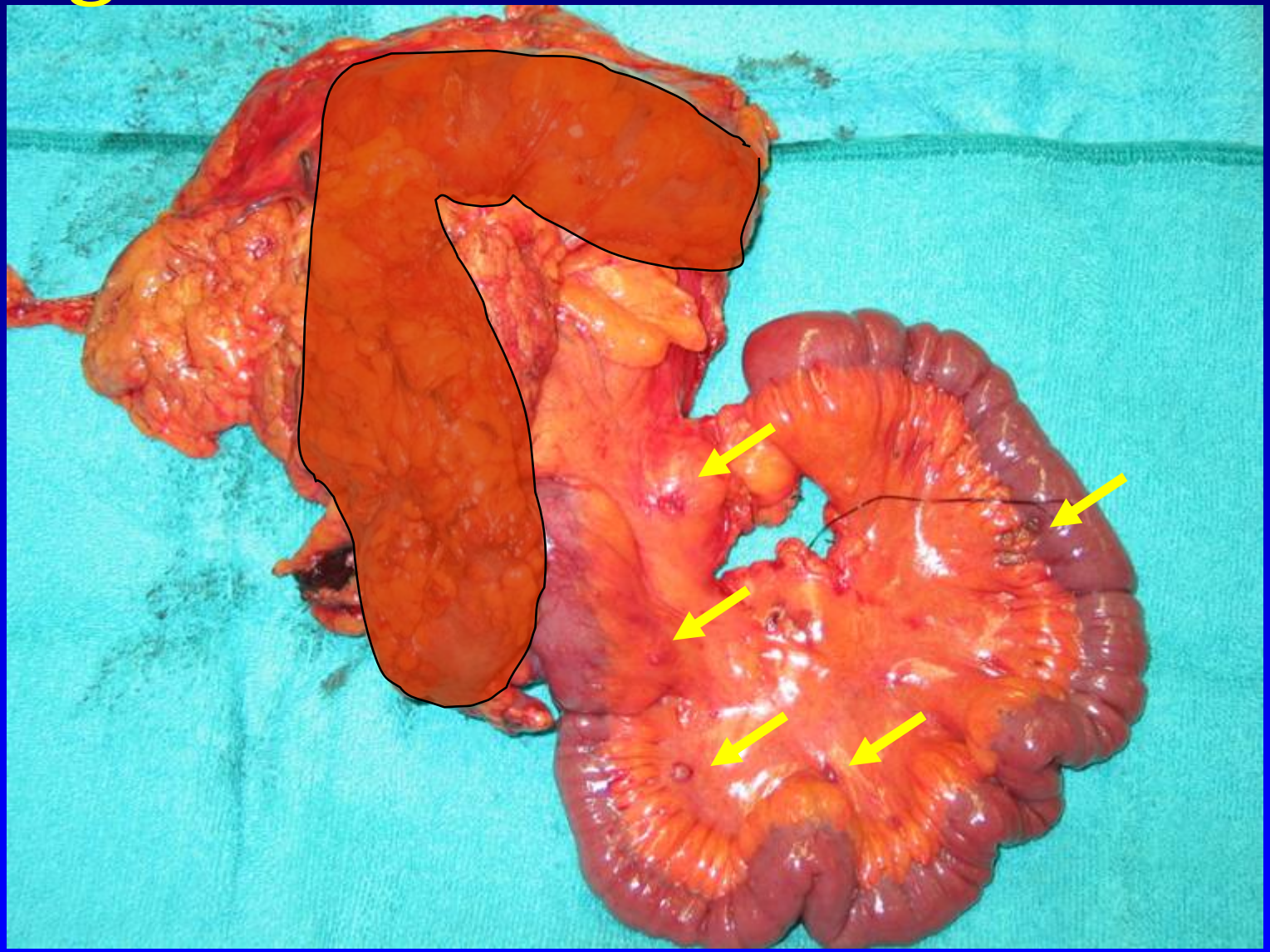


Sugarbaker, J Surg Oncol 2007

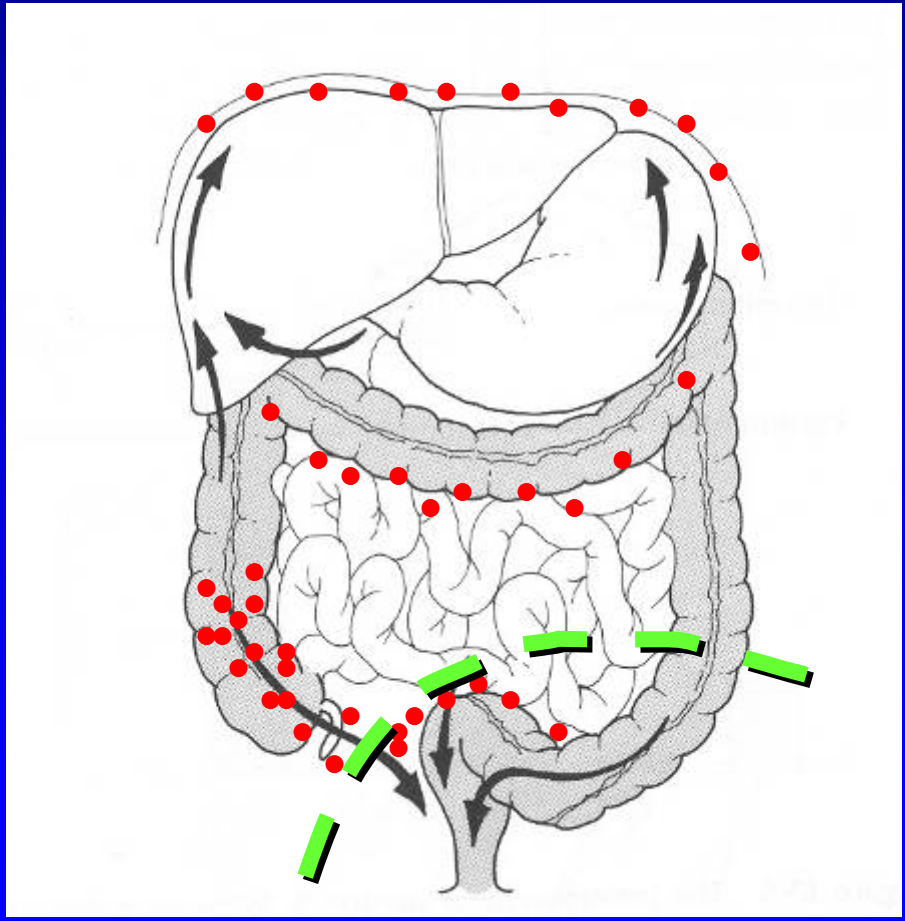
right colon and terminal ileum



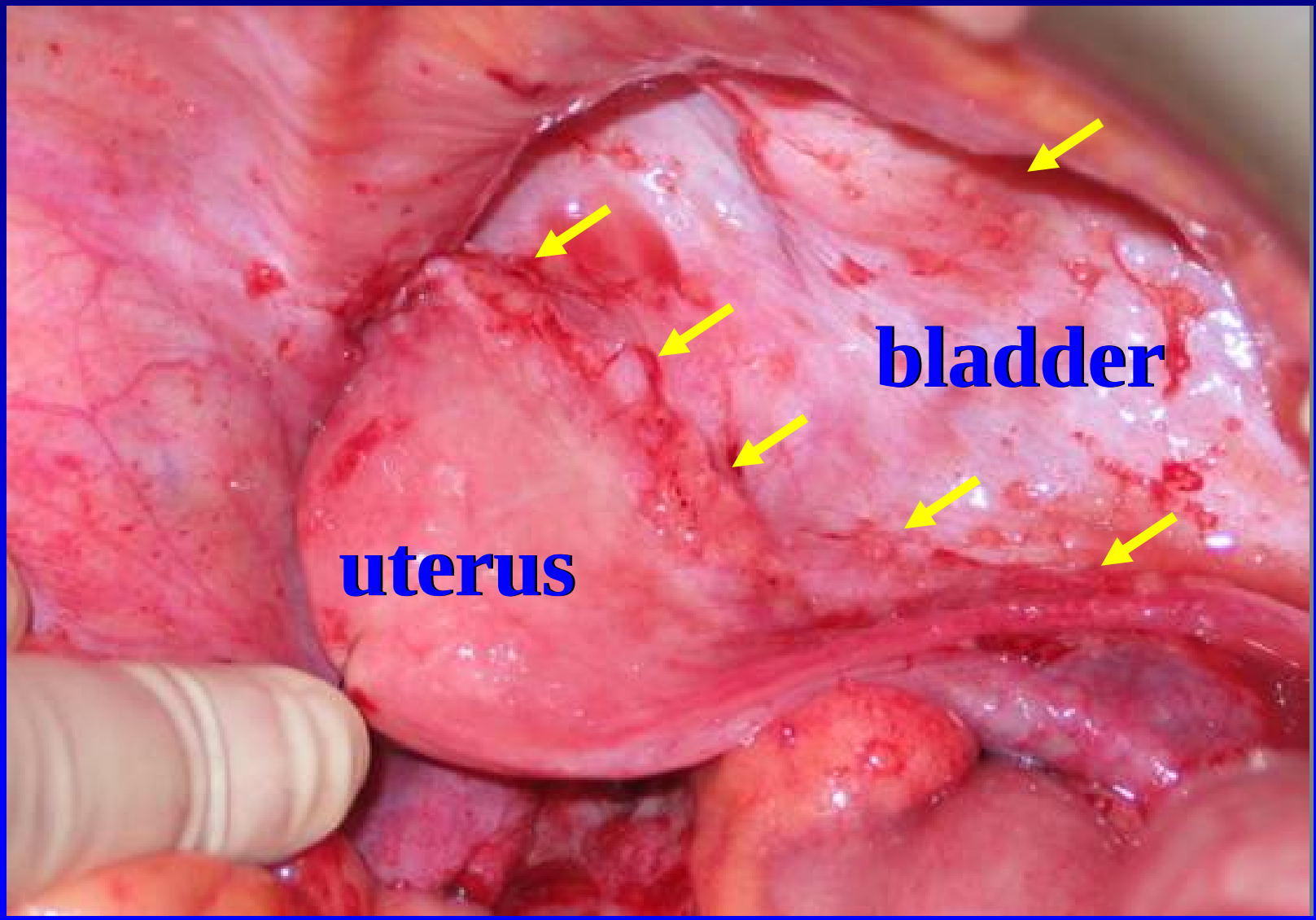
right colon and terminal ileum



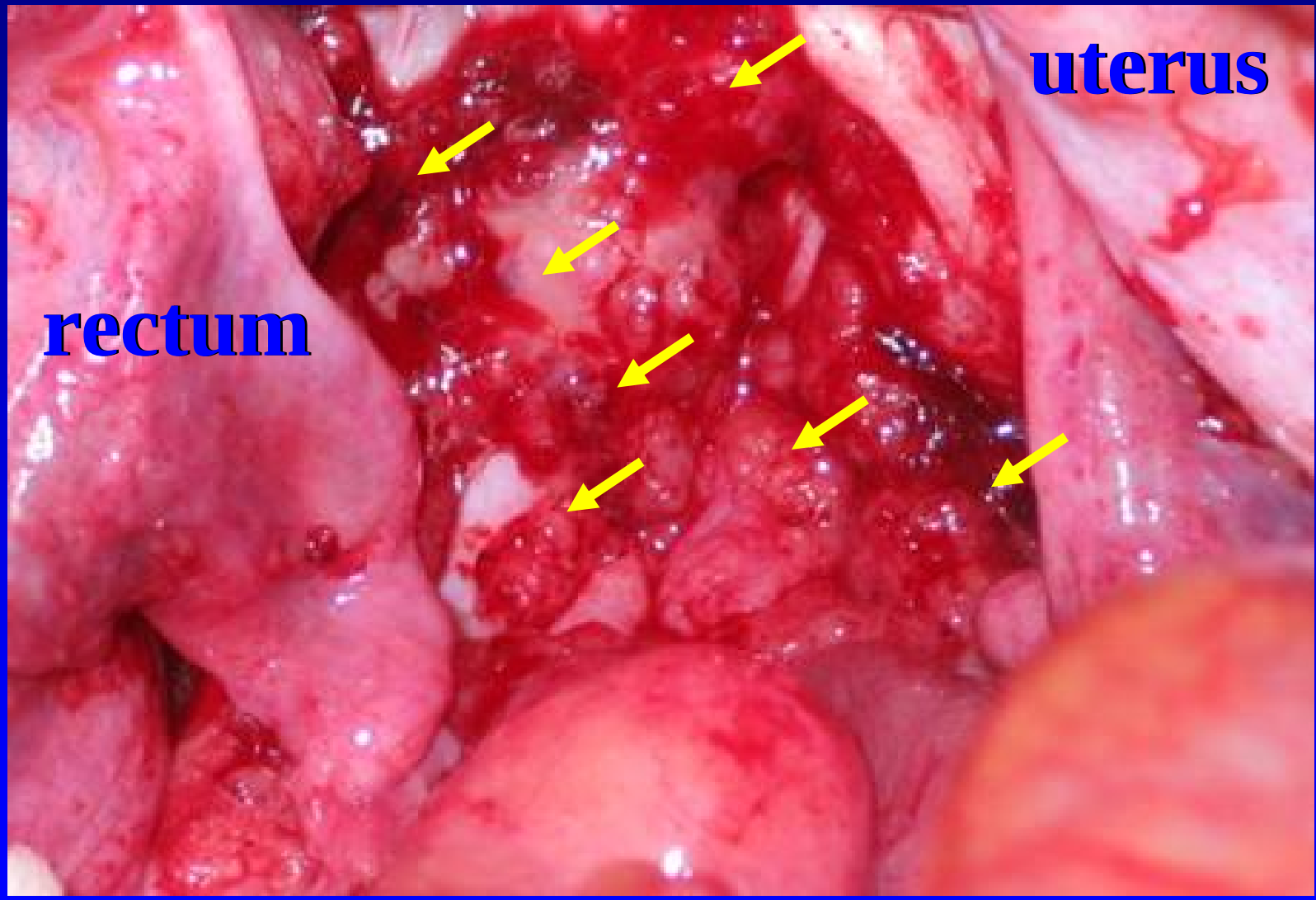
hysterectomy
± rectosigmoid resection



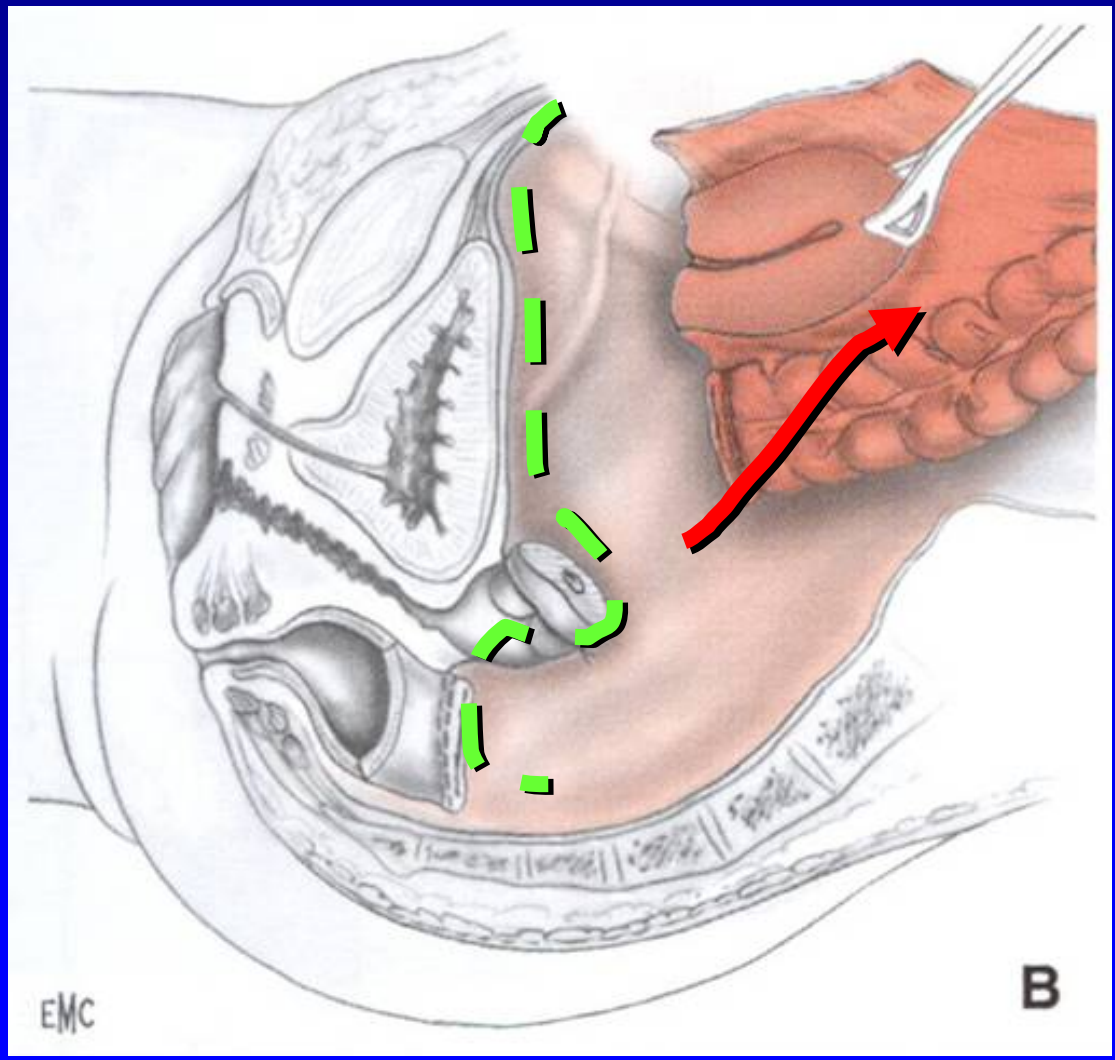
carcinomatosis in front of uterus



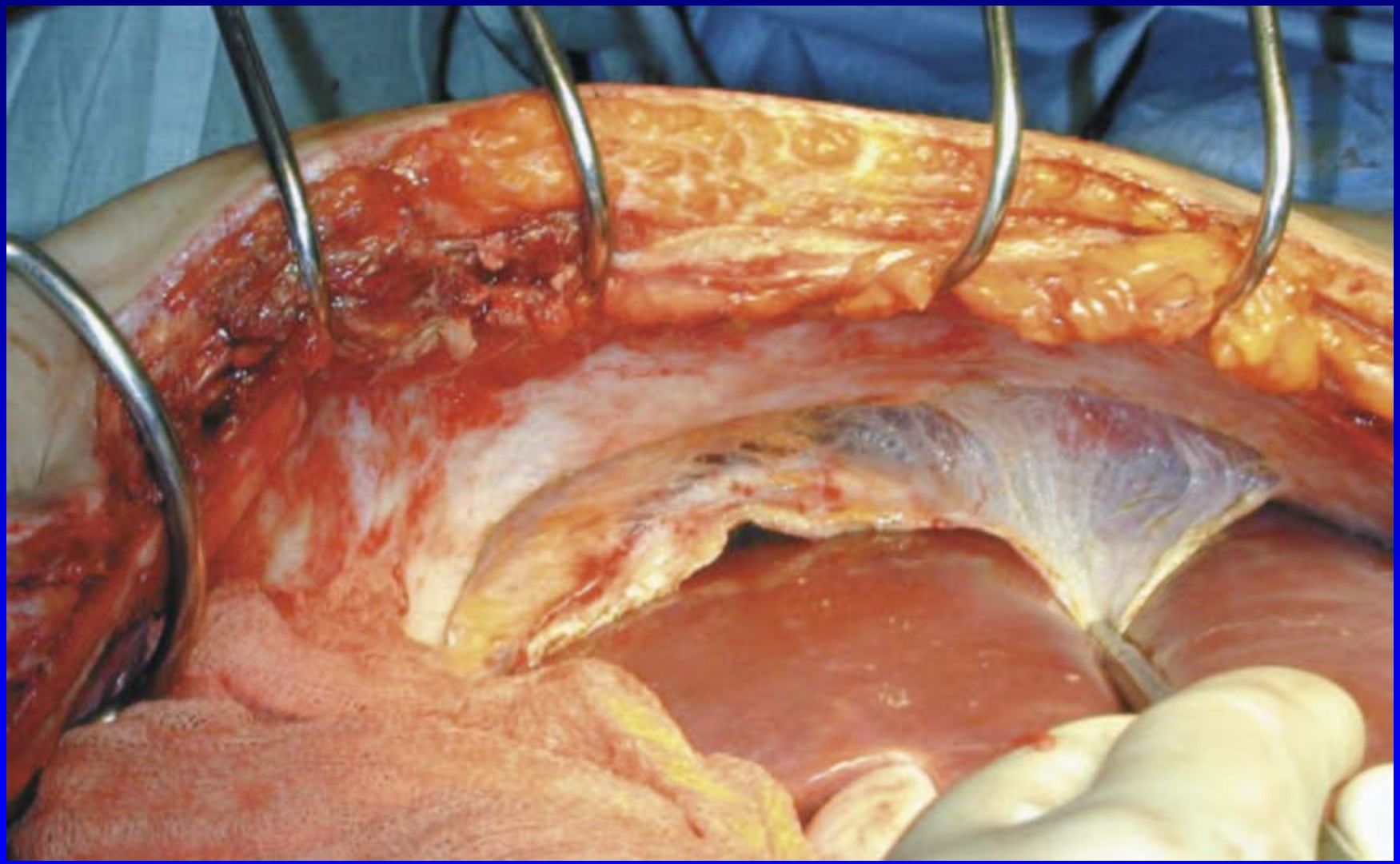
carcinomatosis behind uterus



hysterectomy
+ rectosigmoid resection

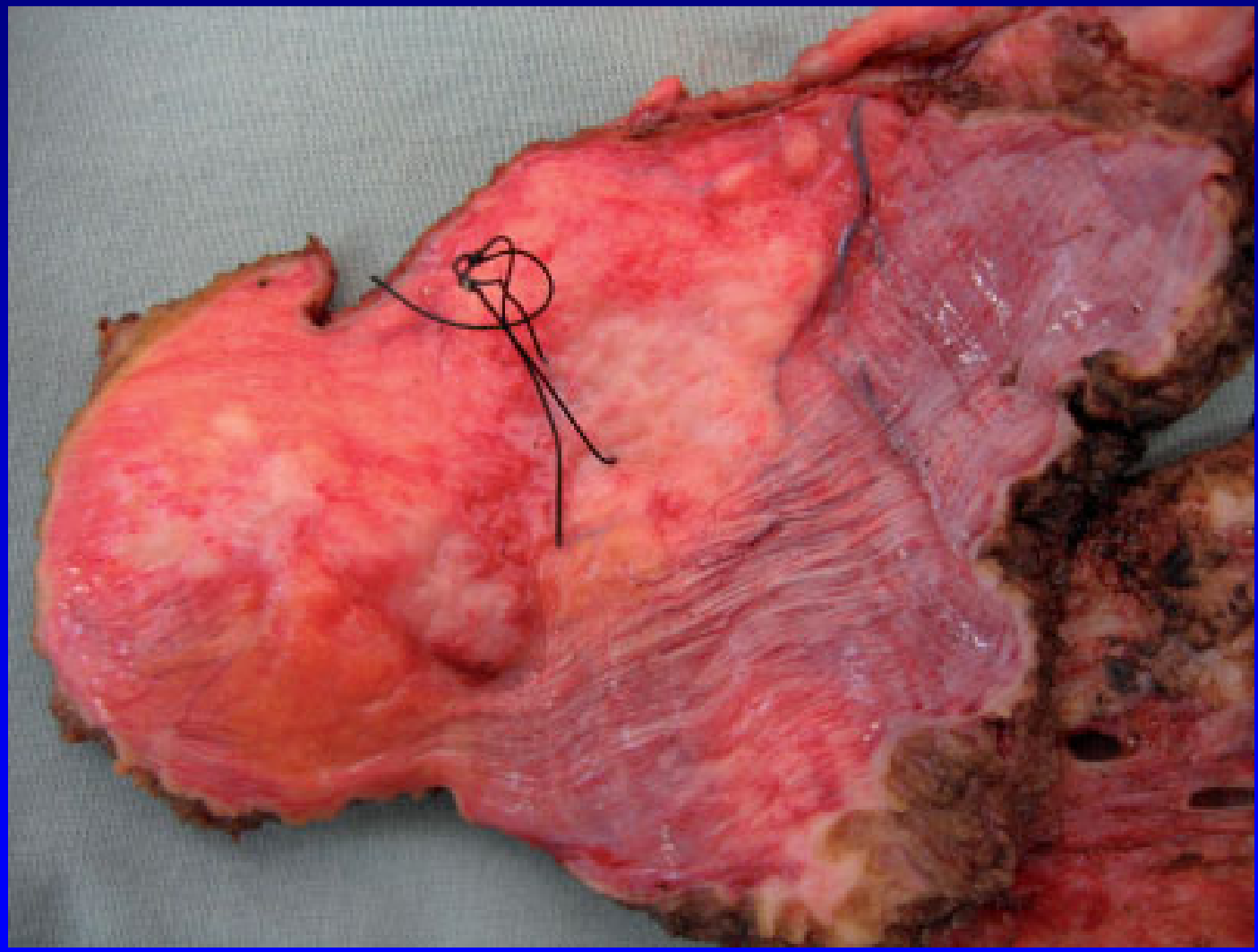


peeling peritoneum diaphragm



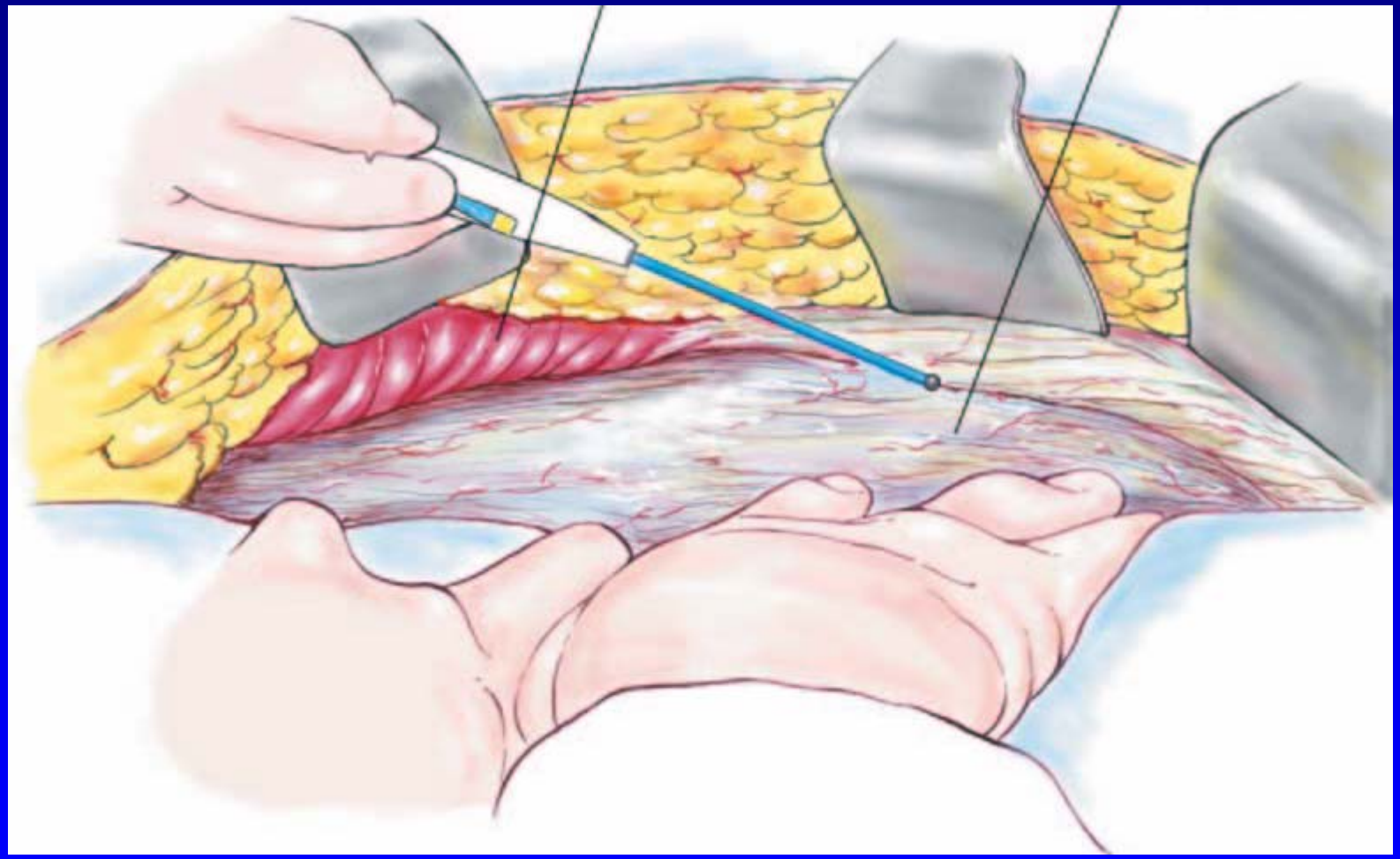
Glehen, Lancet 2004

resection diaphragm



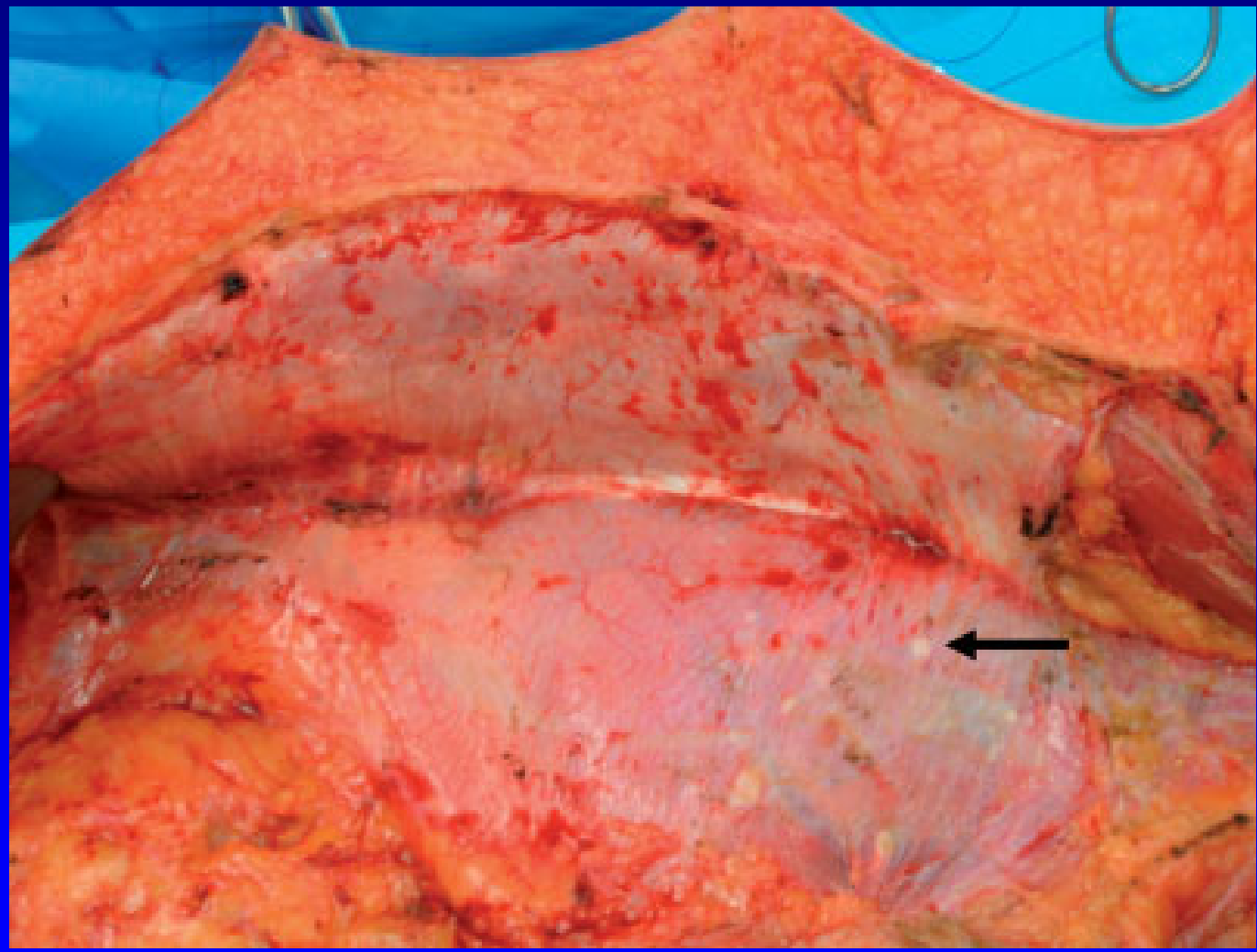
Sugarbaker, J Surg Oncol 2007

peeling of parietal peritoneum



Sugarbaker, Surg Clin N Am 2003

peeling of parietal peritoneum



Sugarbaker, J Surg Oncol 2007

other resections

- cholecystectomy
- splenectomy
- partial cystectomy
- …

Cytoreduction and HIPEC : technique

1. installation
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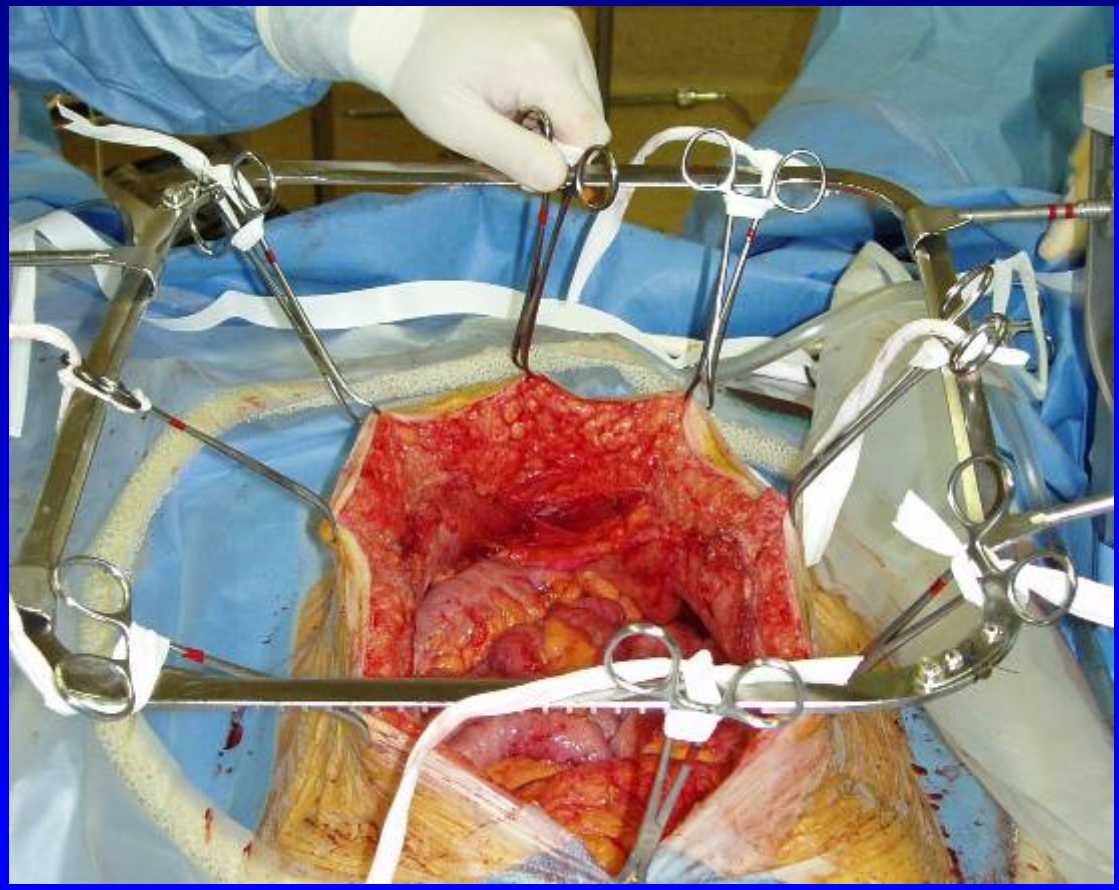
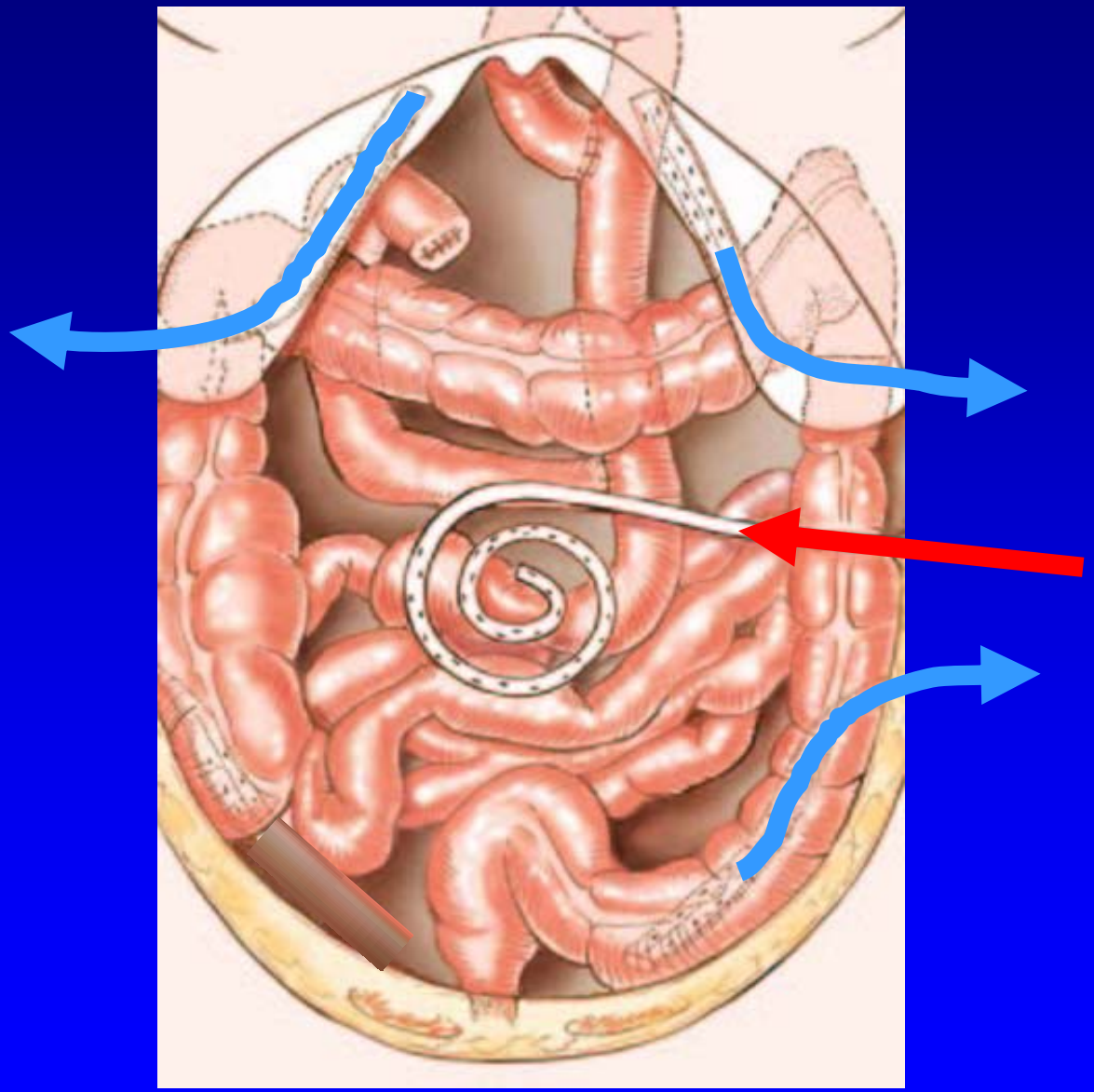
setting up of frame

suspension of abdominal wall

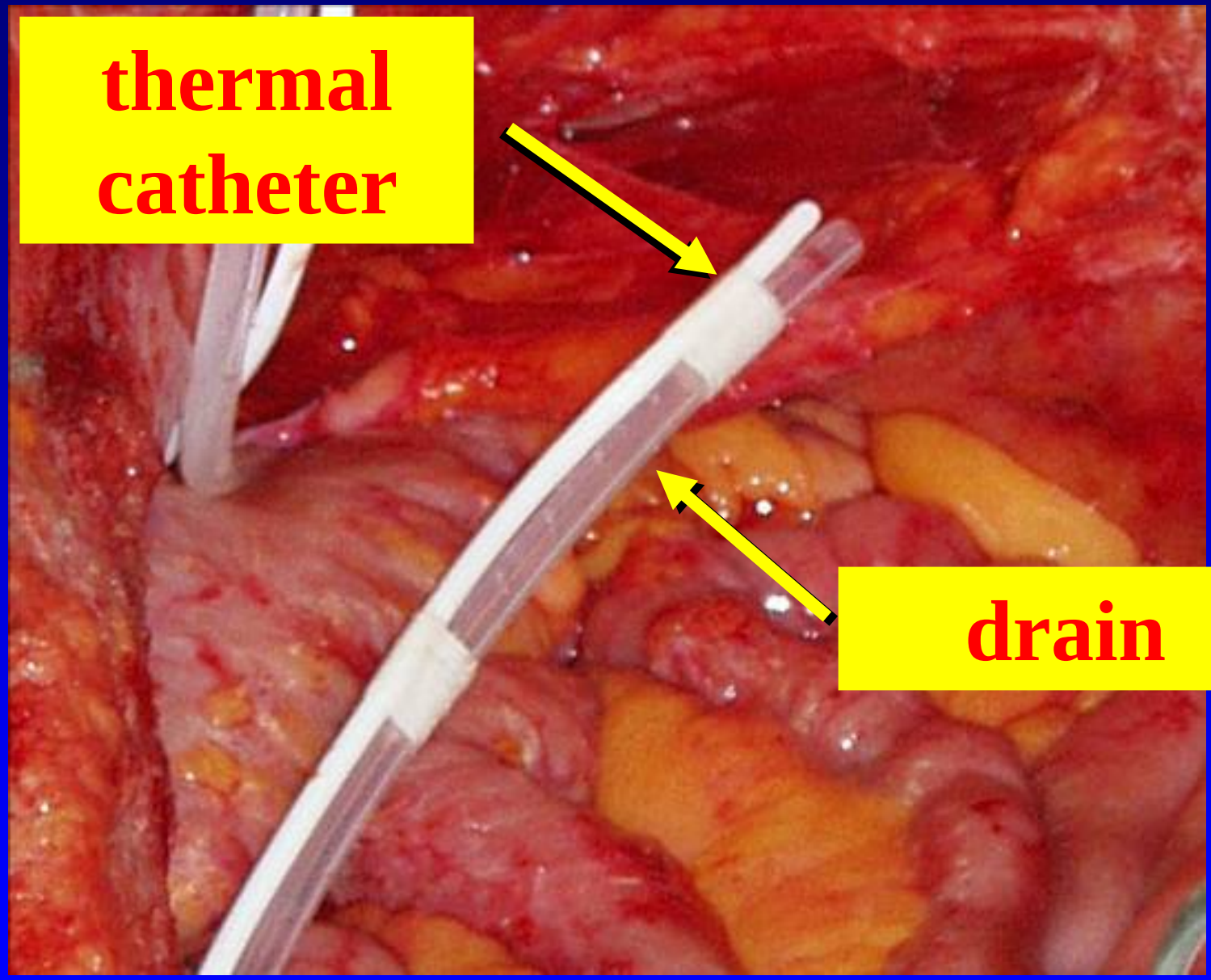


coliseum

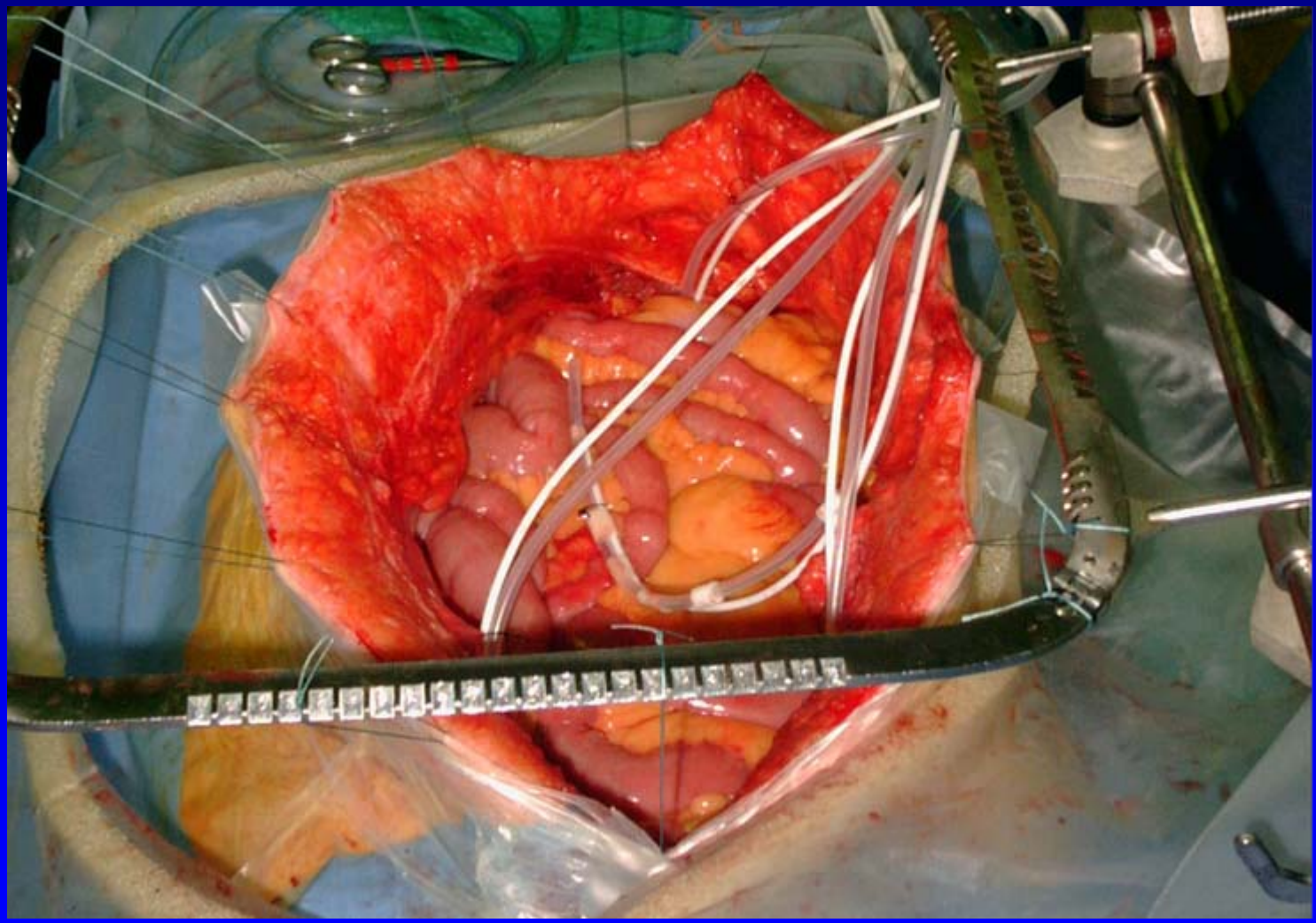
placement of drains



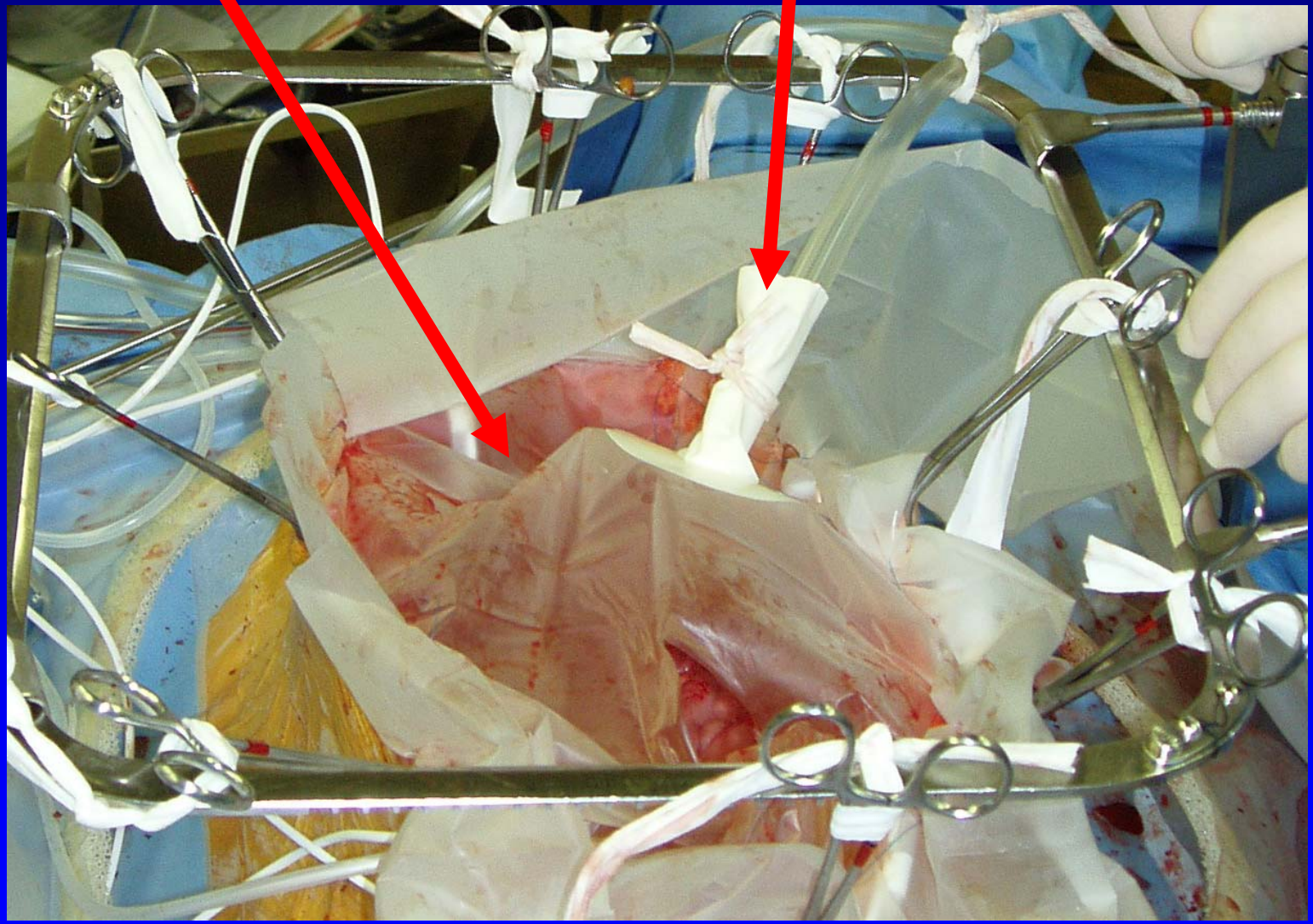
Sugarbaker, Surg Clin N Am 2003

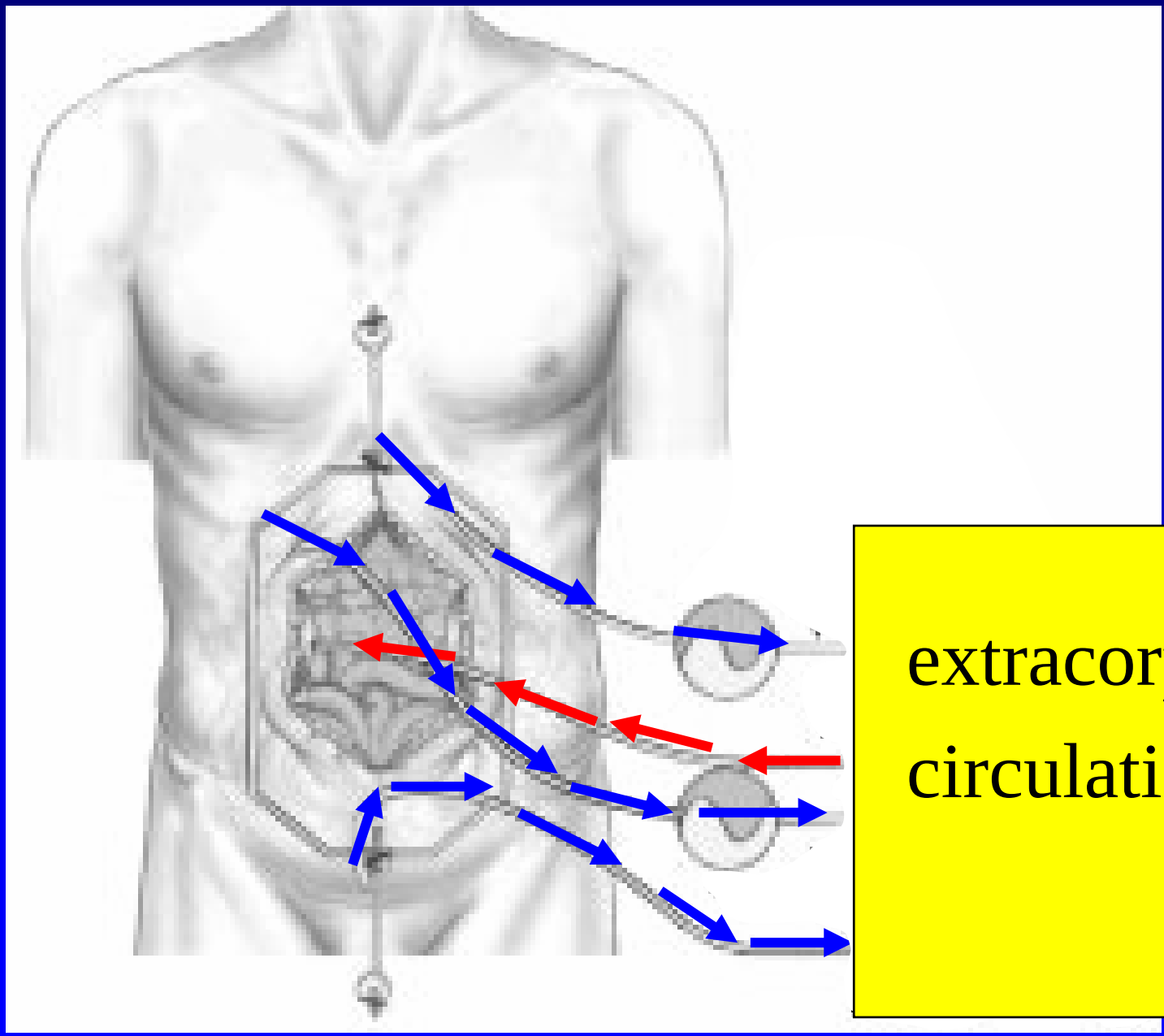

thermal catheter
drain

placement of drains



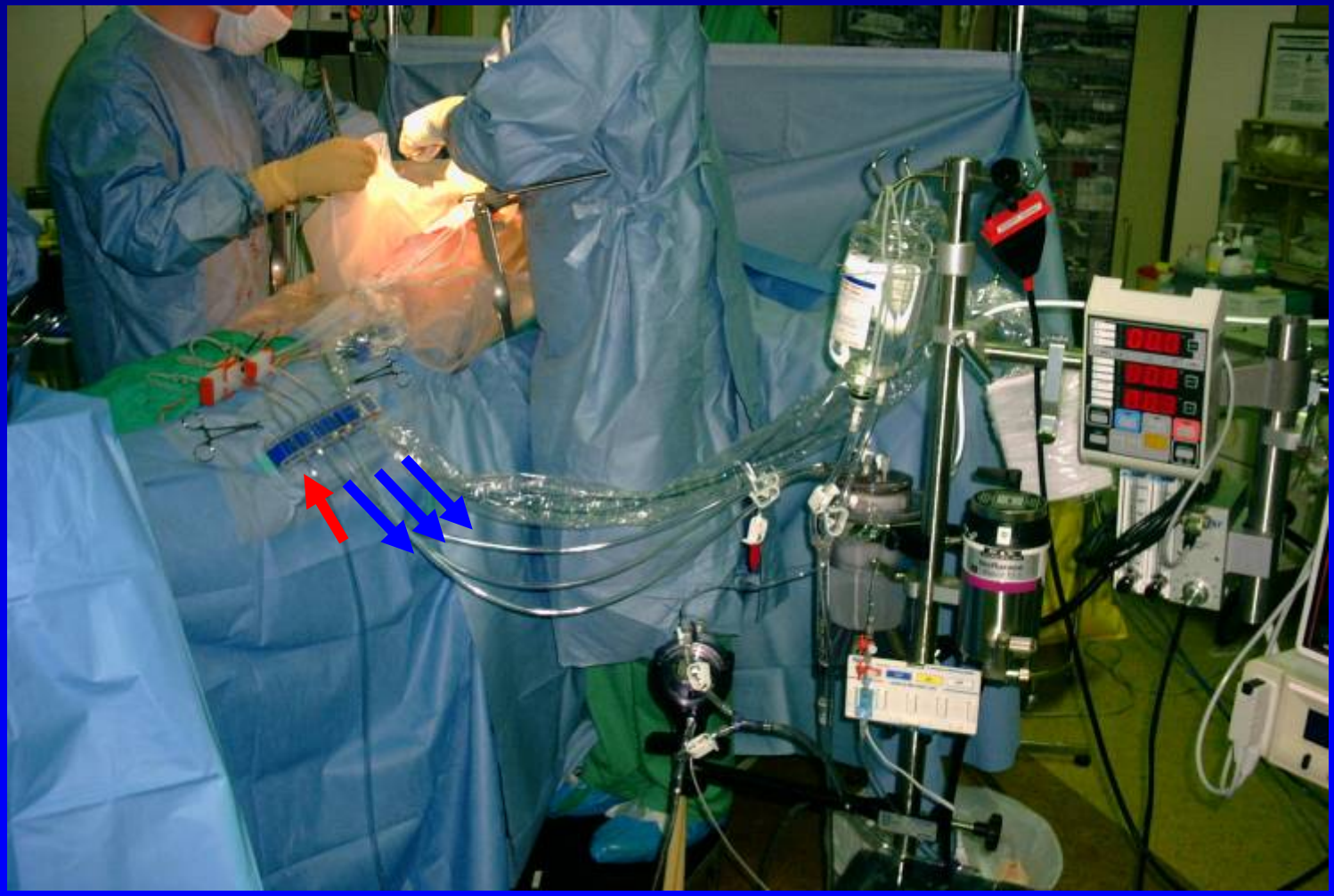
cover sheet fume aspiration tube



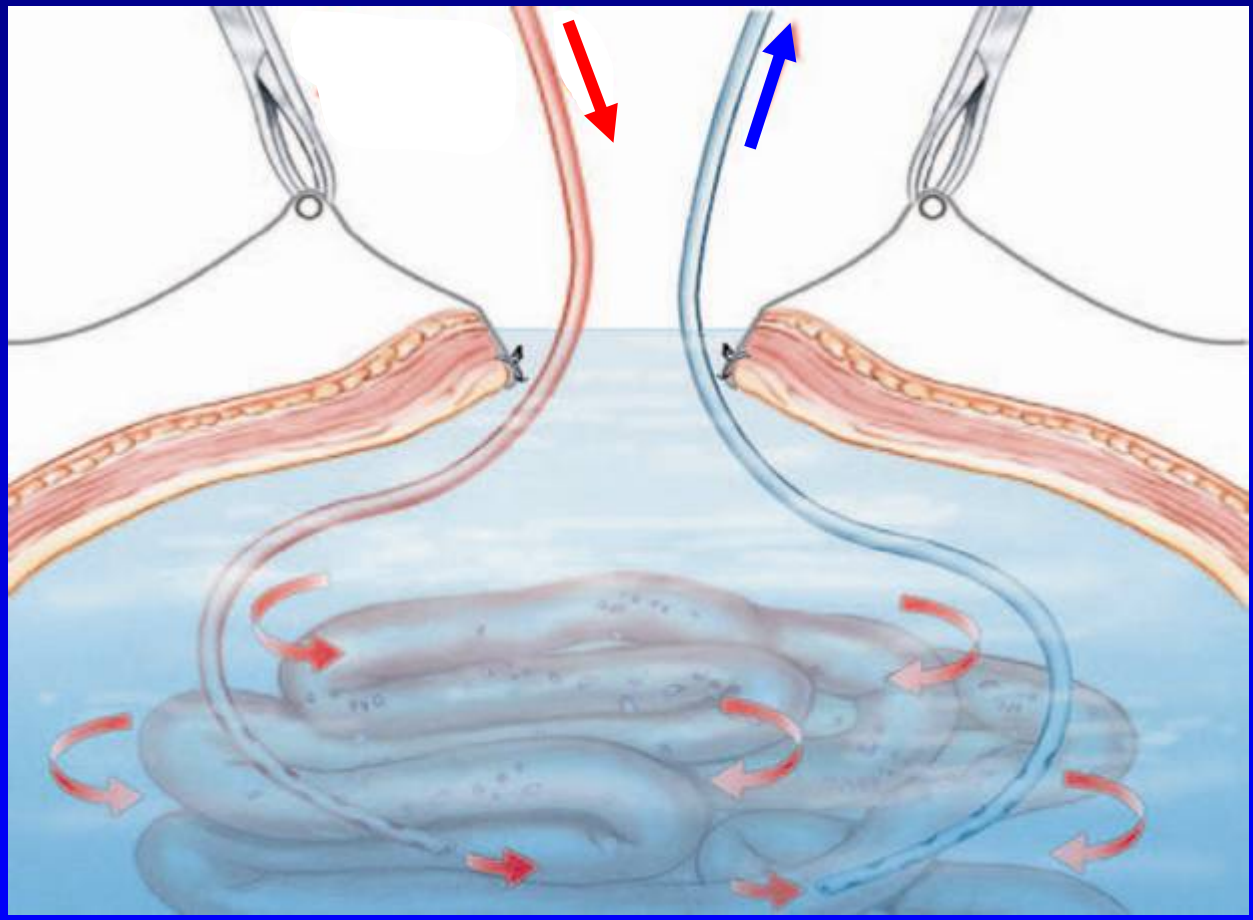


extracorporal circulation

extracorporal circulation



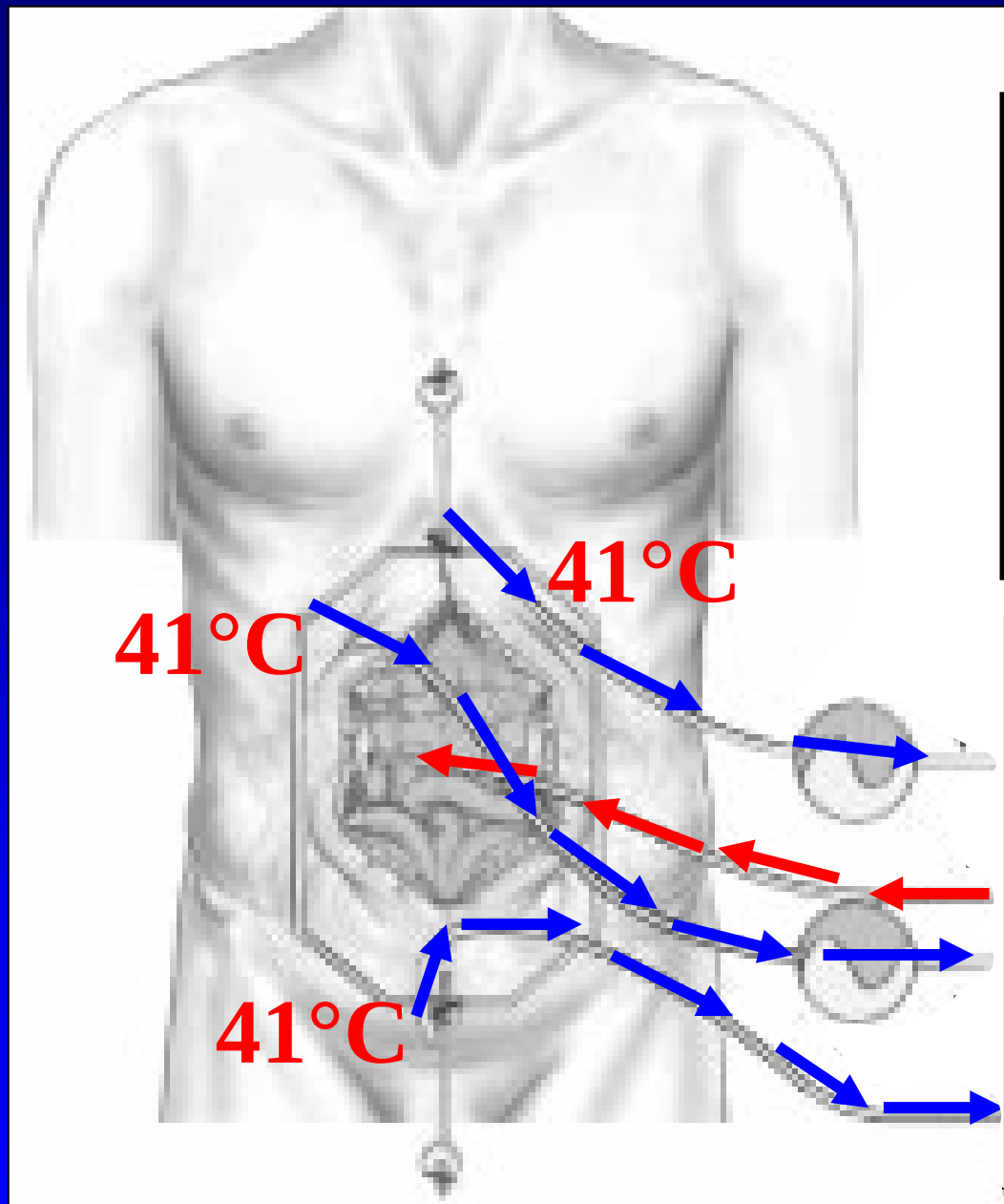
extracorporal circulation



Kianmanesh, J Chir 2009

manual stirring


STOCKERT
40.9
°C



0 min: 1/2 dose

30 min: 1/4

60 min: 1/4

safety risks of HIPEC

- splashes of chemotherapy on:
  - -skin
  - -eyes
- (inhalation of chemo vapours)

protection against toxicity

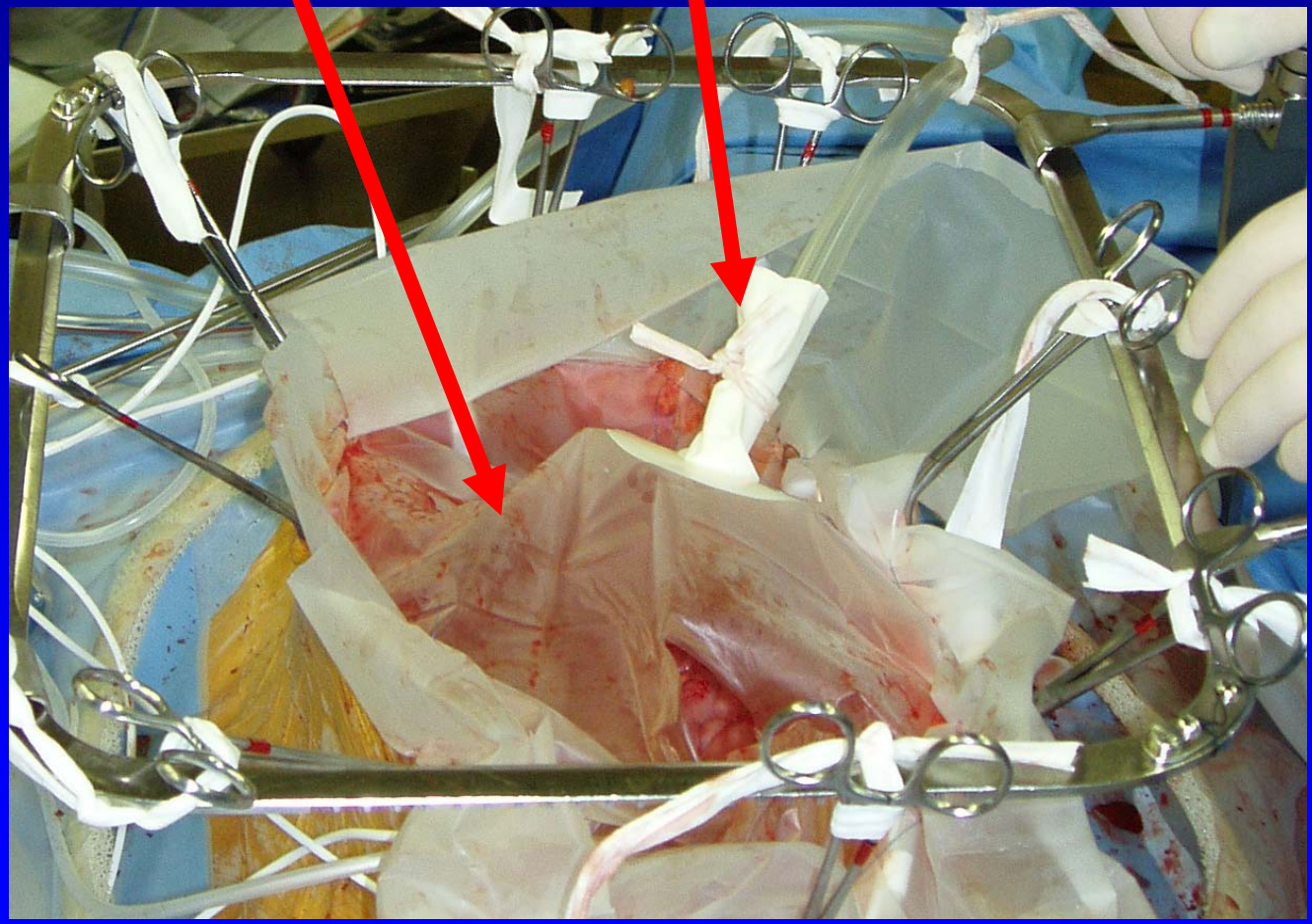
- operative field
- staff
- operation theatre
- safety protocol

protection against toxicity
operative field
cesarian section bag

protection against toxicity

operative field

cover sheet fume aspiration



protection against toxicity

staff

- everybody leaves the room
- no pregnant women
- no breast feeding women

protection against toxicity

staff

impermeable:

- head and neck cover
- mask with filter and screen
- double gloves
- gown
- shoe covers

protection against toxicity

operation theatre

door closed

negative pressure

HIPEC running

protection against toxicity

operation theatre

KIT

protection against toxicity

safety protocol

Clinique du Parc Léopold

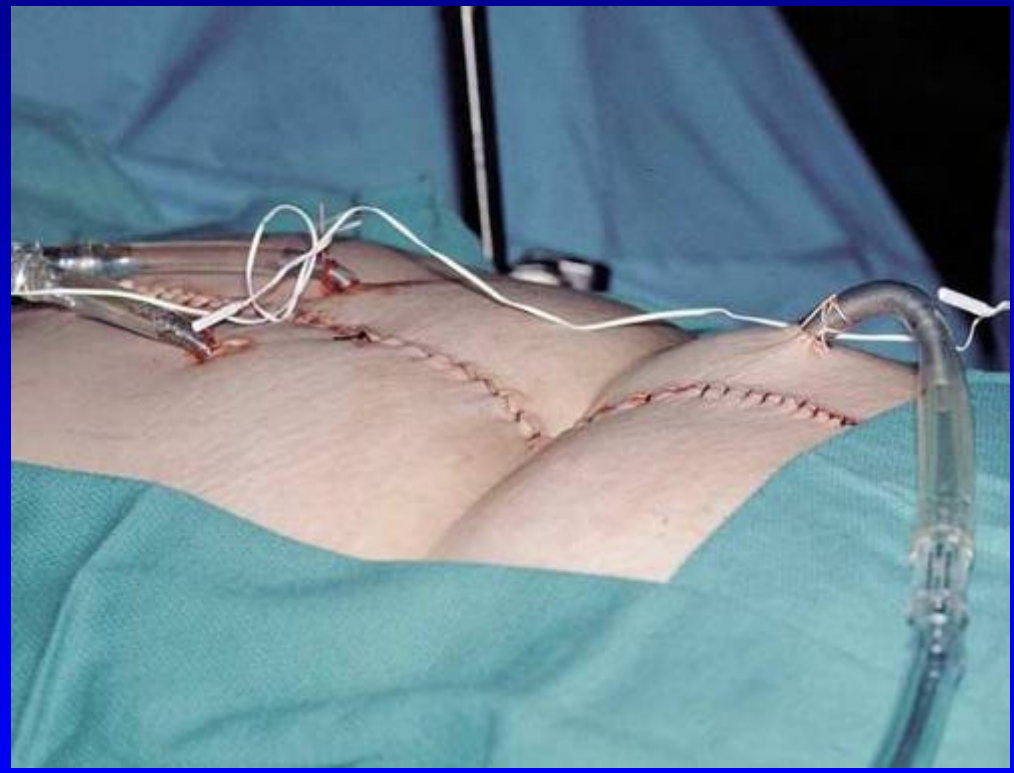
Debulking et HIPEC: matériel et procédures

Dr. Stefaan Mulier
en collaboration avec:

Mme Bertrand, Corine
Mr. Bouche, Jean-Marc
Mme Carpintero, Reyes
Mr. Chaval, Olivier
Dr. Claes, Jean-Pierre

technical variations

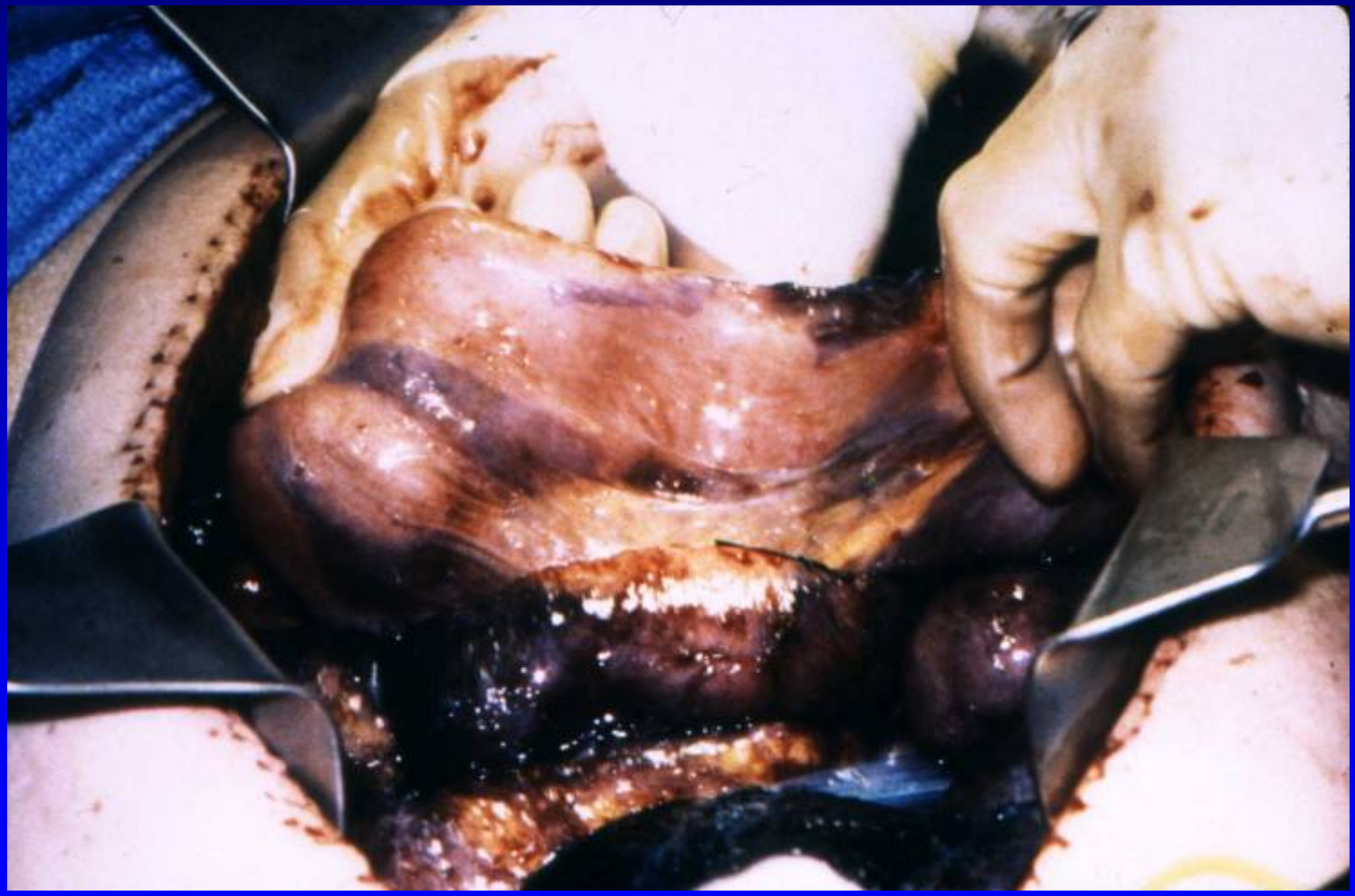
open



closed

Stewart 2005 Ann Surg Oncol

technical variations



closed

Sugarbaker 1998

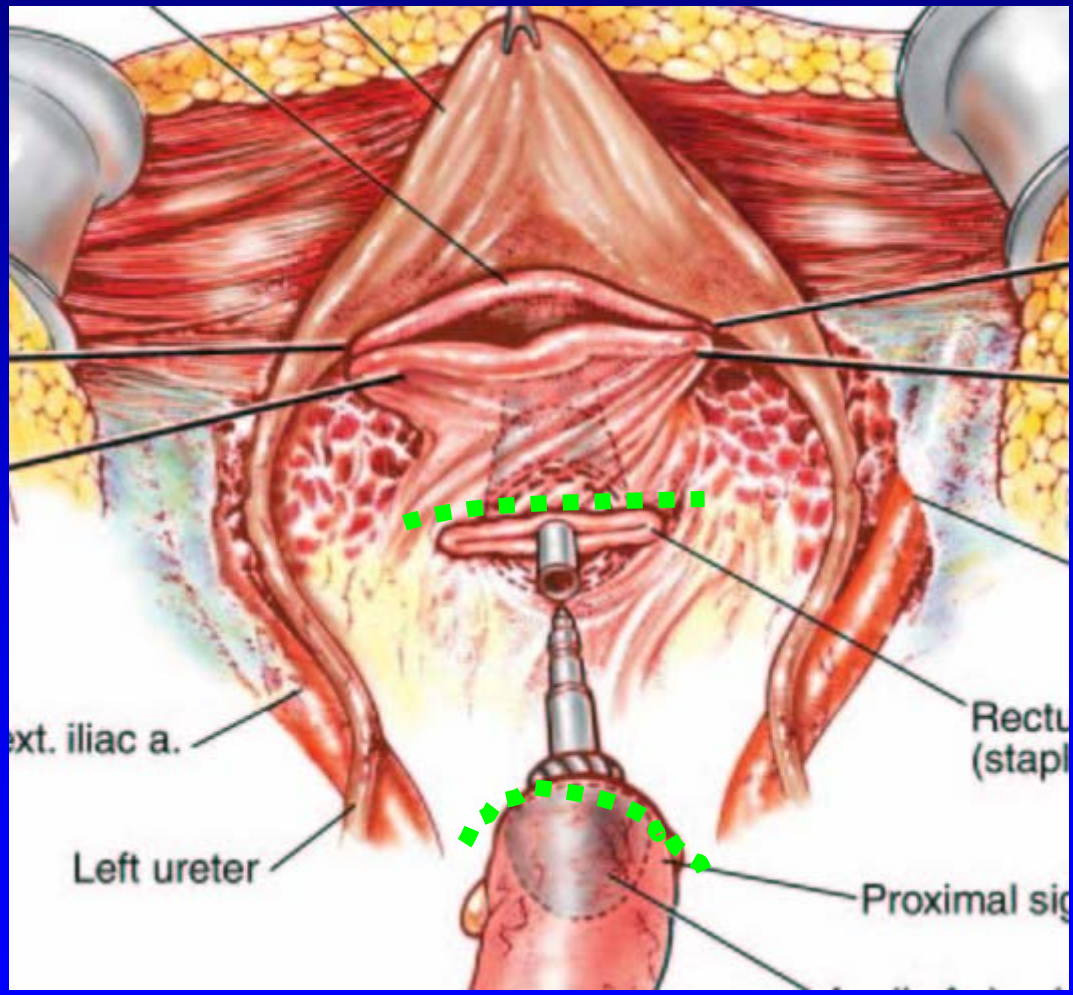
technical variations

postoperative

Cytoreduction and HIPEC : technique

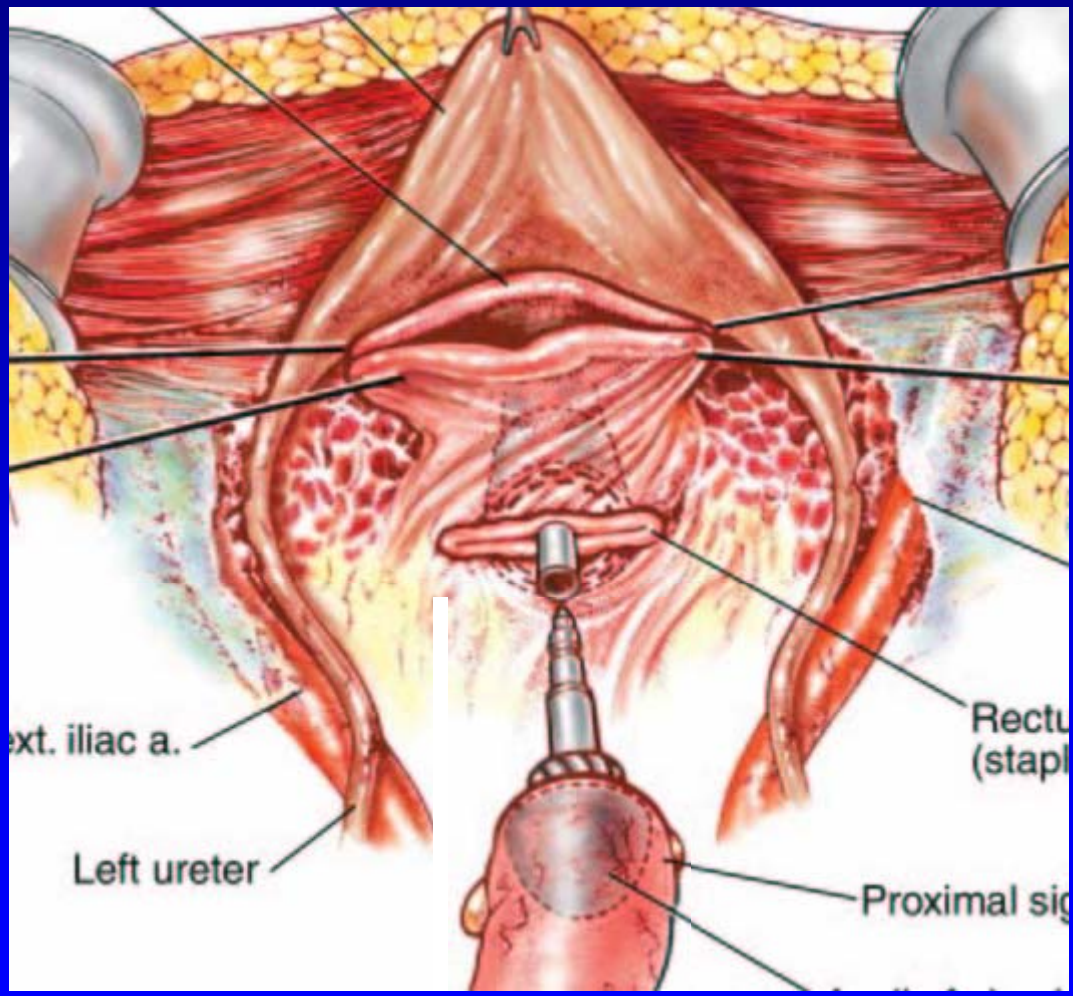
1. installation
2. exploration
3. cytoreduction
4. HIPEC
5. reconstruction
6. drains

resection of suture lines



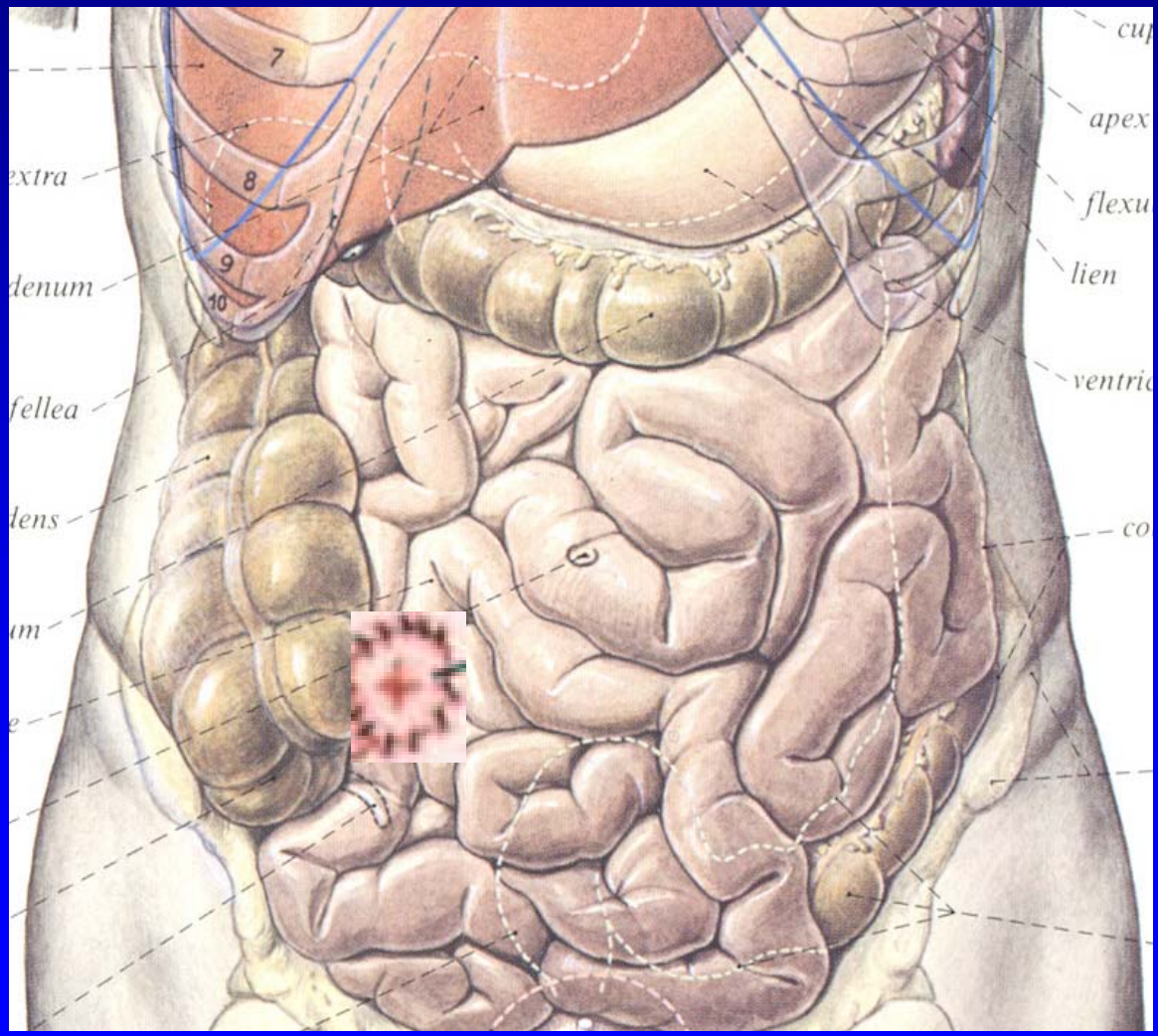
Sugarbaker, Surg Clin N Am 2003

anastomosis



Sugarbaker, Surg Clin N Am 2003

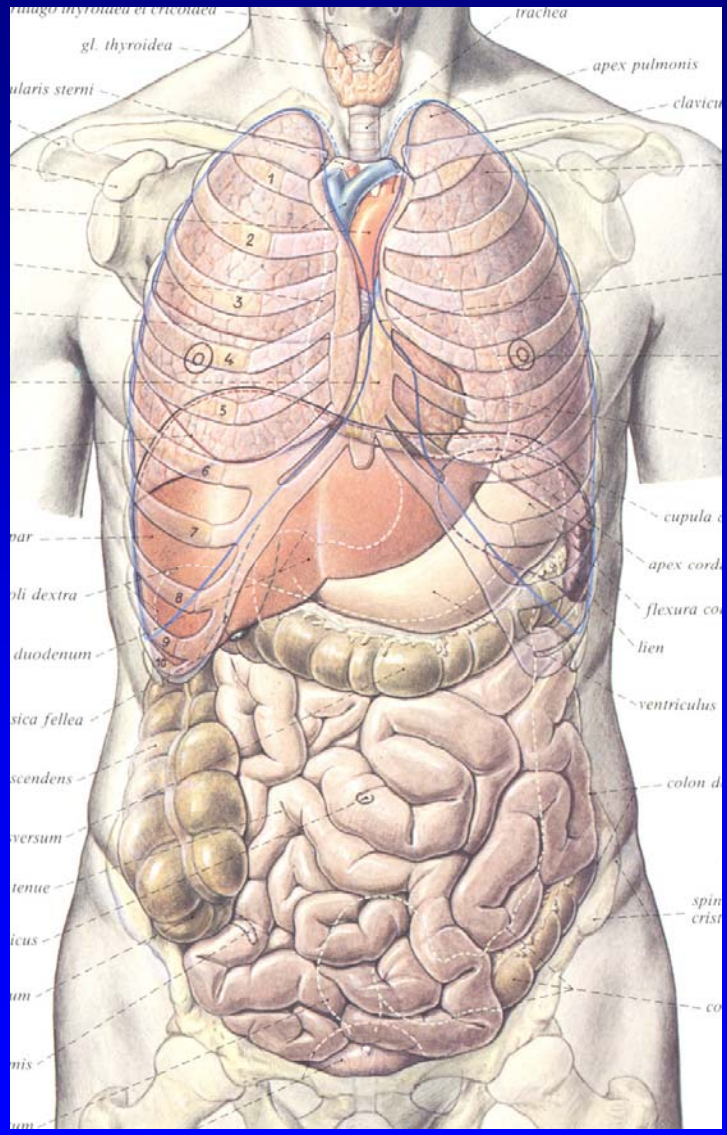
protective ileostomy



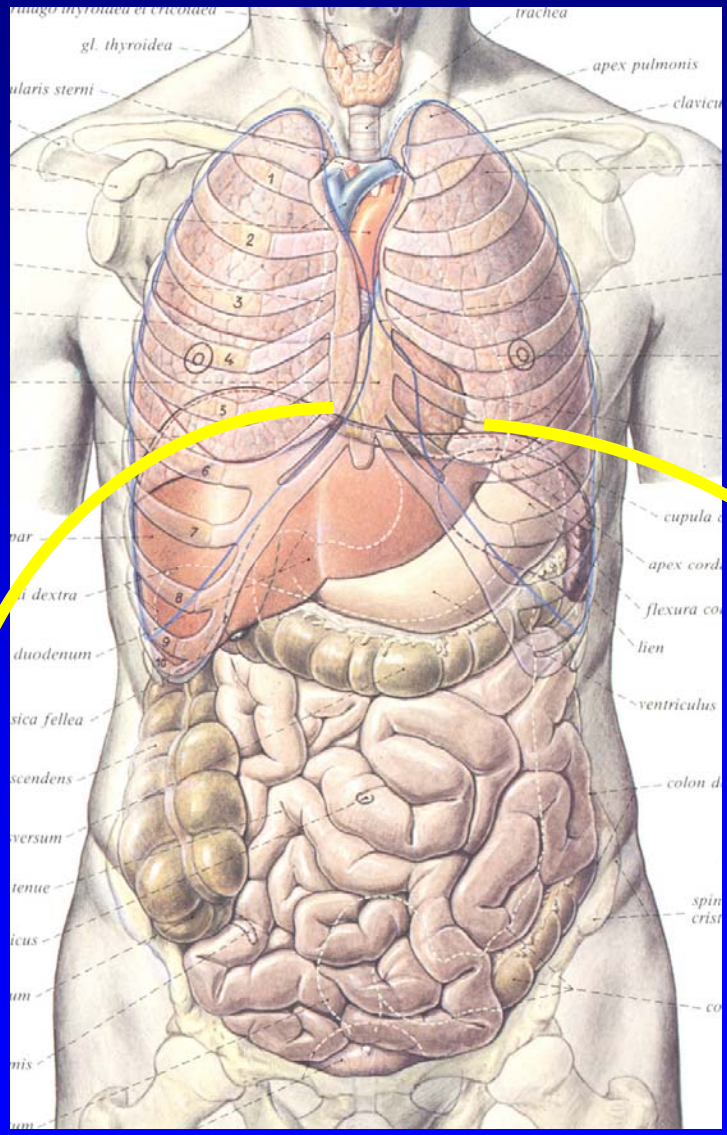
Cytoreduction and HIPEC : technique

1. installation
2. exploration
3. cytoreduction
4. HIPEC
5. reconstruction
6. drains

drains


gl. thyroidea
trachea
apex pulmonis
1
2
3
4
5
6
7
8
9
10
duodenum
lien
ventriculus

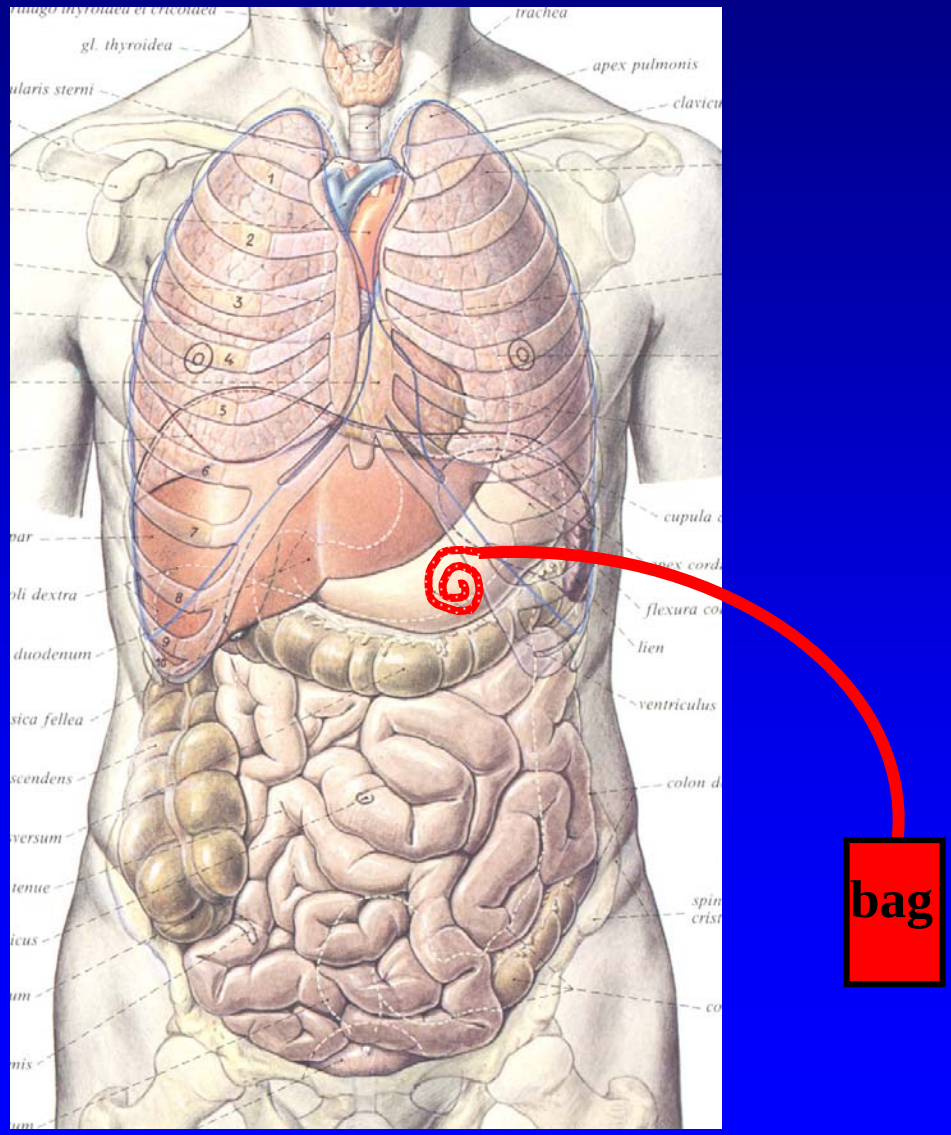
two thoracic drains



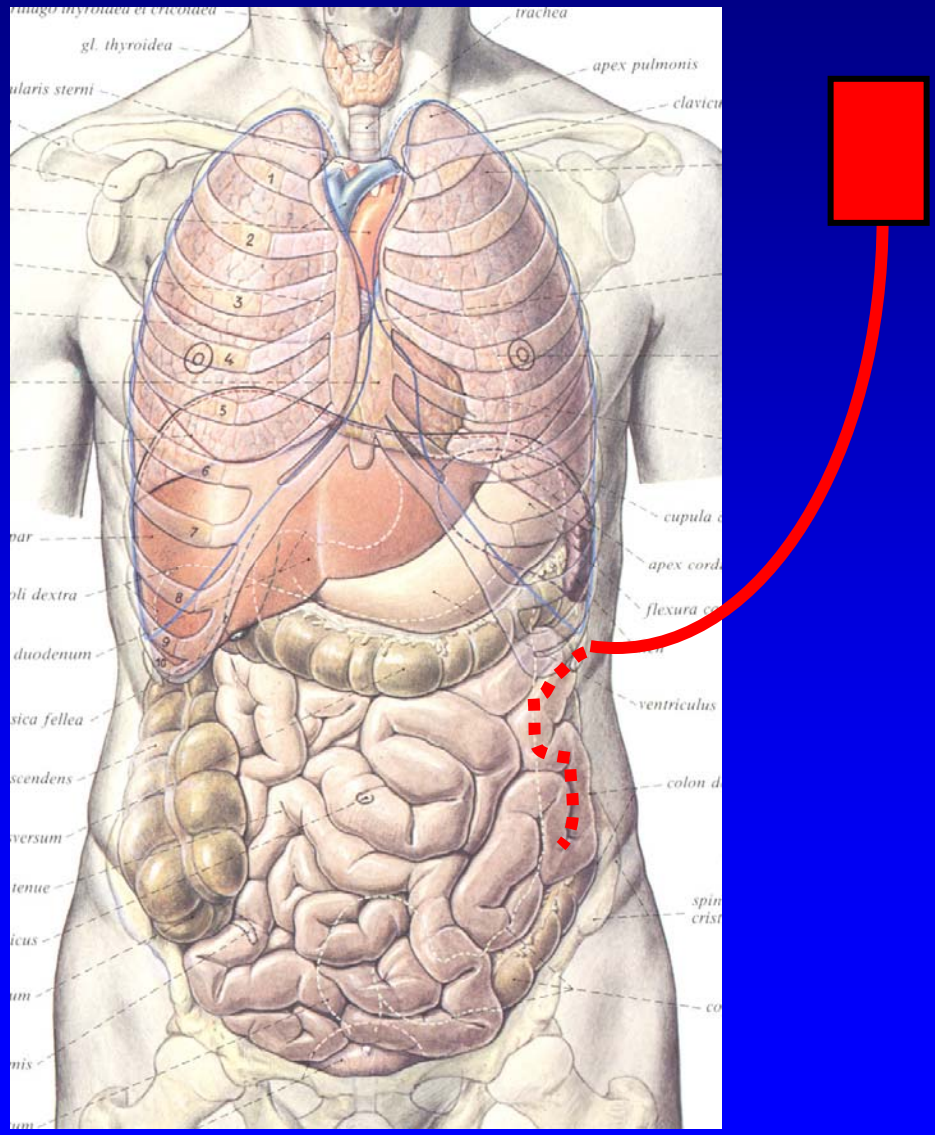
vacu-tainer

vacu-tainer

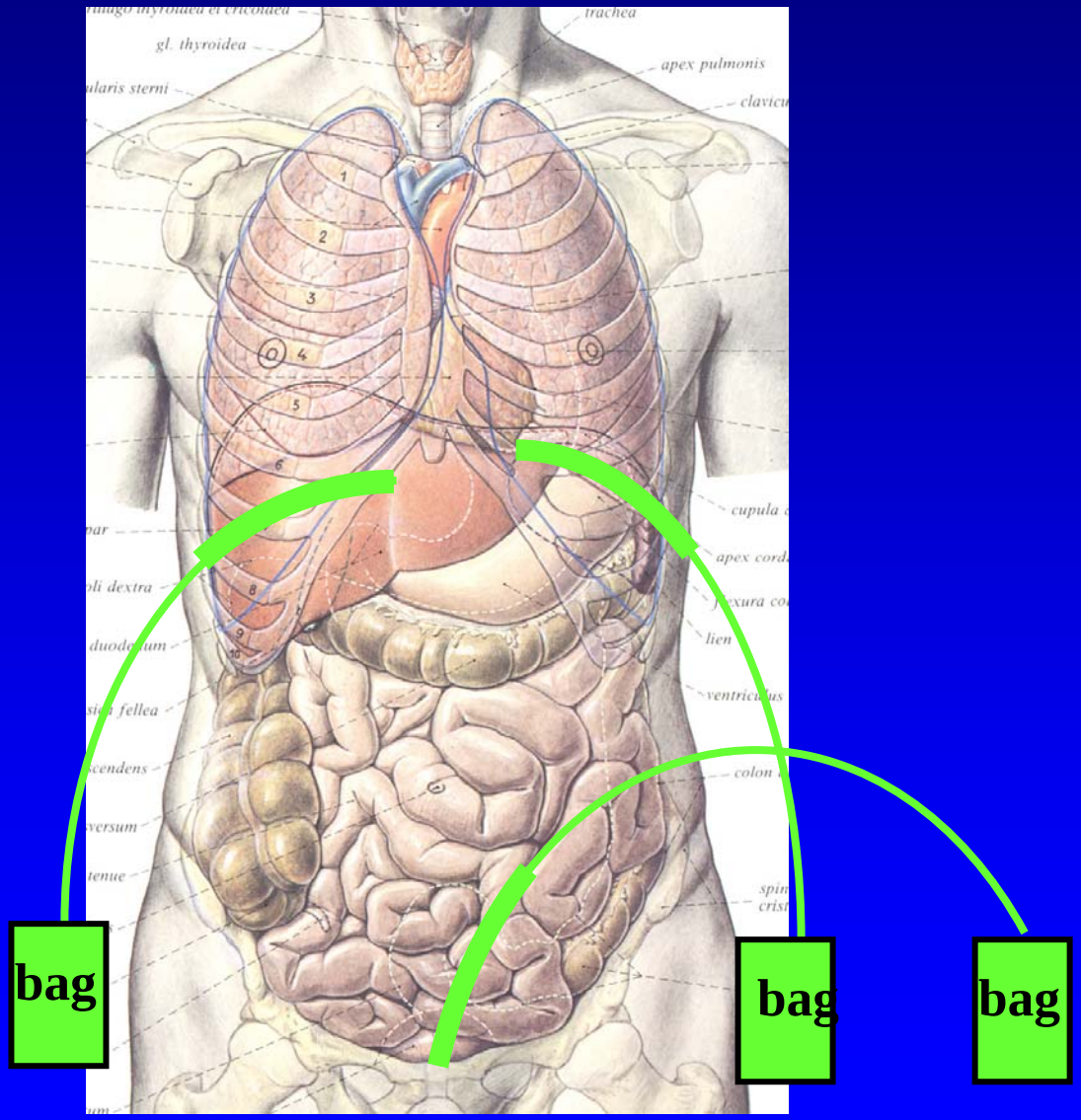
evacuating gastrostomy



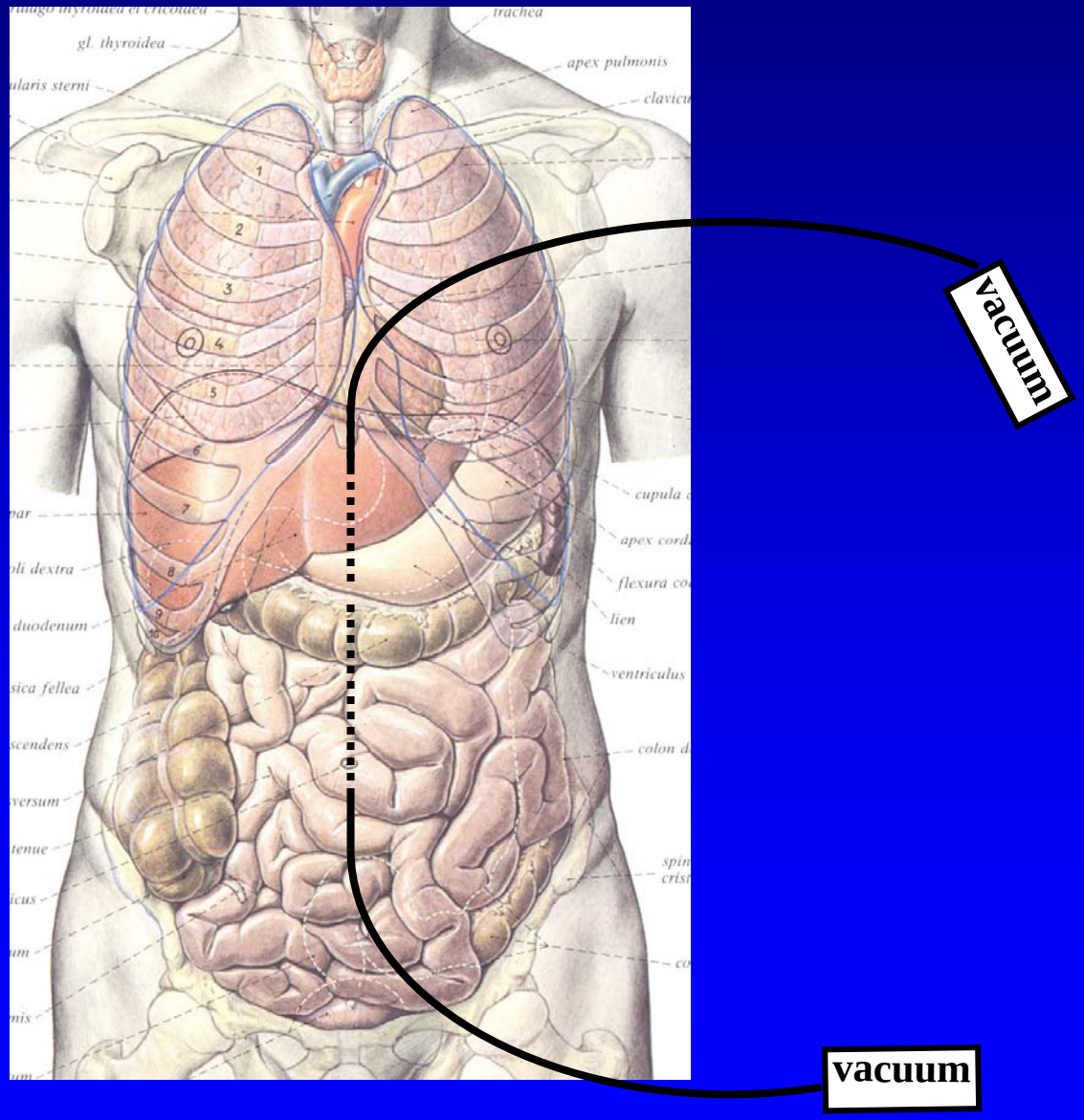
feeding jejunostomy

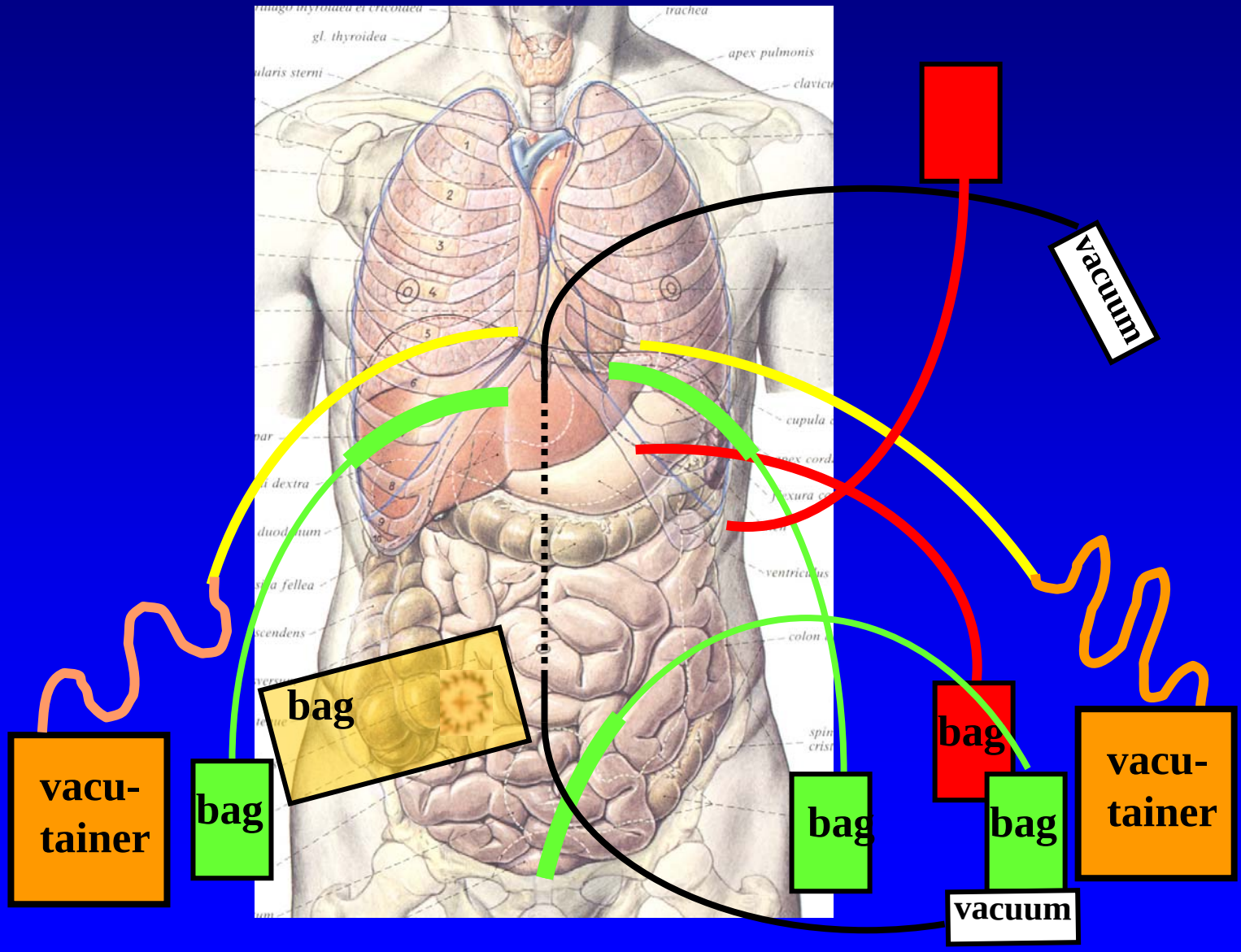


three abdominal drains



two subcuaneous drains




vacuum
vacu-
tainer
bag
bag
bag
bag
bag
vacu-
tainer
vacuum


12
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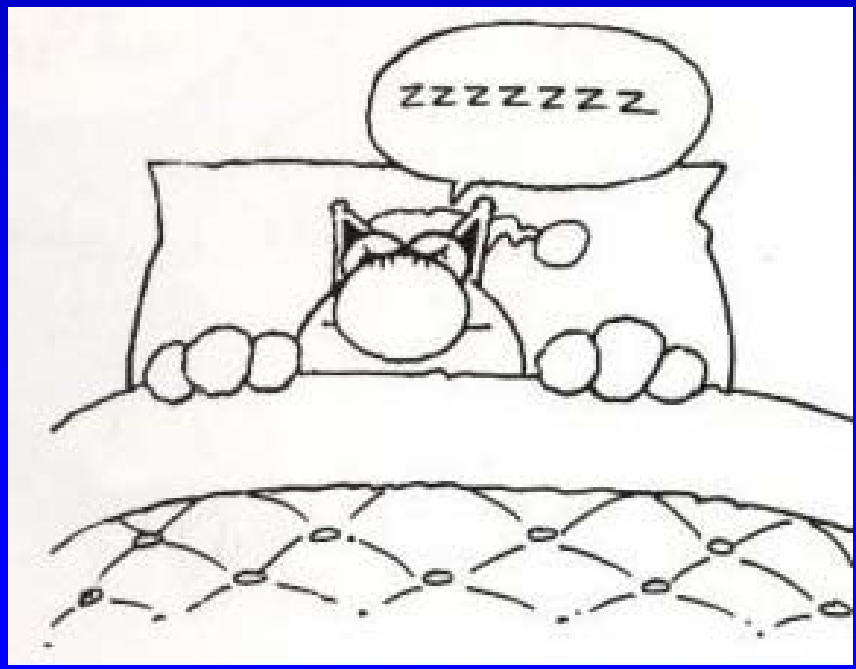
11


zzzzzzz

HIPEC: intensive care

- 3 days

- monitor hydro-ionic balance (burn)
- correct hypoalbuminaemia
- correct low clotting factors
- monitor pain management (epidural)

HIPEC: ward

- 2-6 weeks

- gastroparesis:
  - evacuating gastrostomy
  - feeding jejunostomy
- revalidation kinesitherapy

HIPEC: home

- revalidation kinesitherapy
- regular follow-up at the outpatient clinic
- adjuvant chemotherapy 6 months

Cytoreduction and HIPEC for colorectal carcinomatosis

- introduction
- technique
- results
- indications

HIPEC for colorectal carcinomatosis: results

- complications
- survival
- quality of life

HIPEC: complications

~ chemotherapy: not specific for HIPEC

- neutropenia
- thrombopenia

HIPEC: complications

~ chemotherapy: specific for HIPEC

oxaliplatin:

- hyperglycemia/ ionic disturbances (common)
- repetitive unexplained bleeding (rare)

HIPEC: complications

~ operation: not specific for HIPEC

– bleeding

– infection

– …

HIPEC: complications

~ operation: specific for HIPEC

– anastomotic leakage

– compression of skin/nerves

– pleural effusion

HIPEC: complications

- morbidity: 25-66%
- mortality: 2-15%

Verwaal, J Clin Oncol 2003

HIPEC: complications

- related to the extent of the surgery
- related to risk factors

Stephens Ann Surg Oncol 1999, Verwaal J Surg Oncol 2004

HIPEC: complications

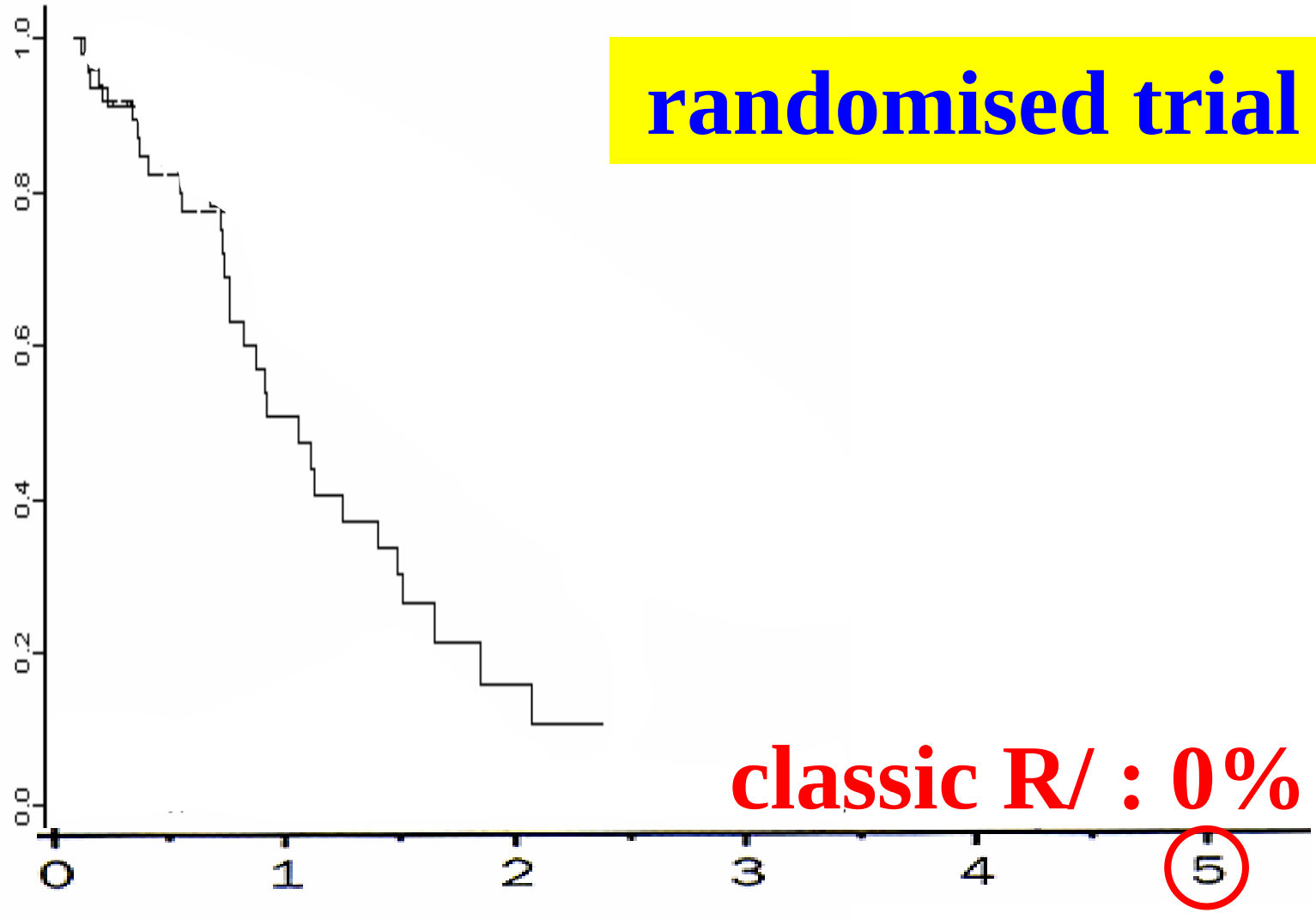
- obstruction, ascitis and/or poor general condition: † **15%**
- no obstruction, no ascites and good general condition: † **4%**

Shen, Ann Surg Oncol 2004

HIPEC for colorectal carcinomatosis: results

- complications
- survival
- quality of life

HIPEC: 5 year survival

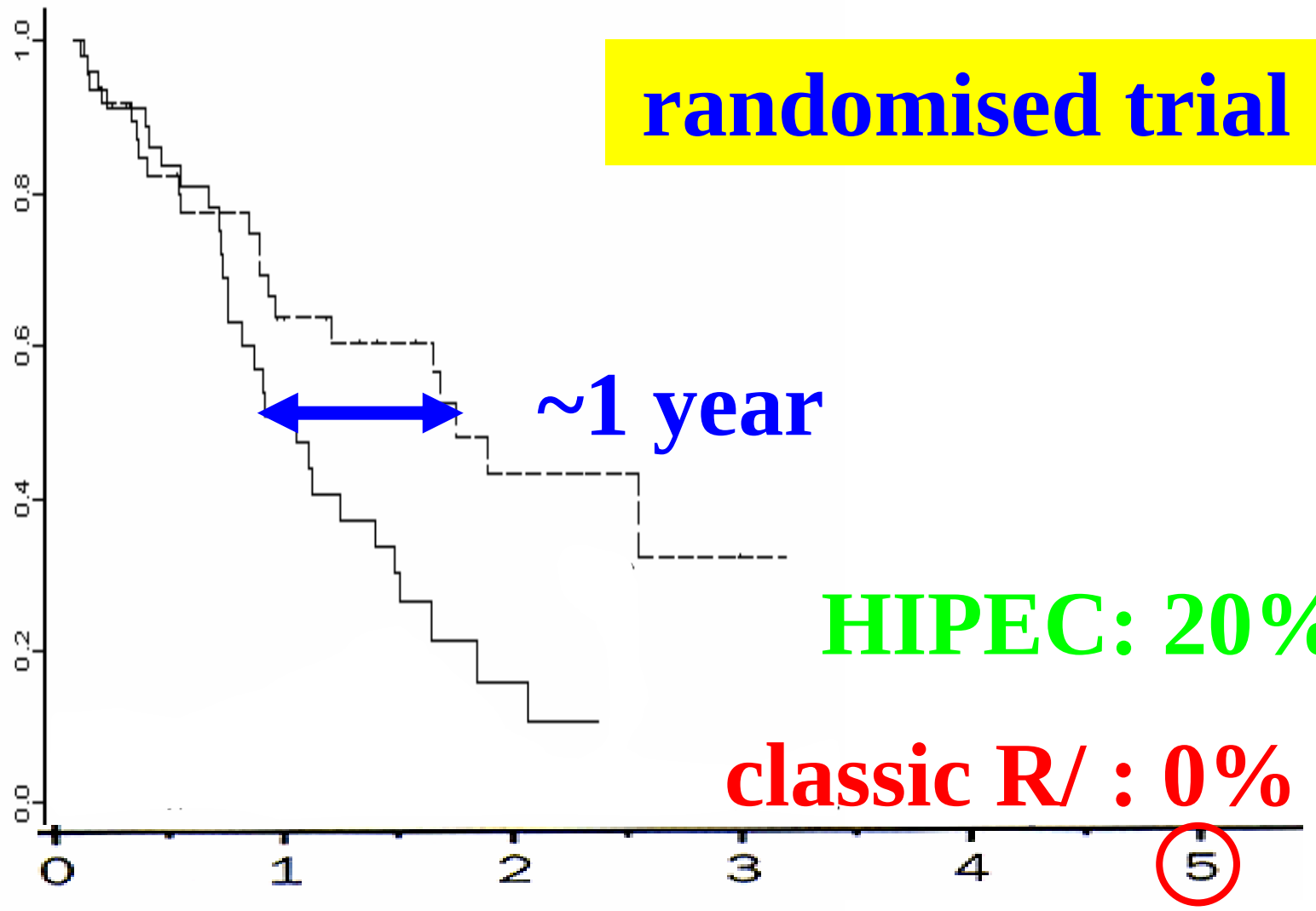


randomised trial

classic R/ : 0%

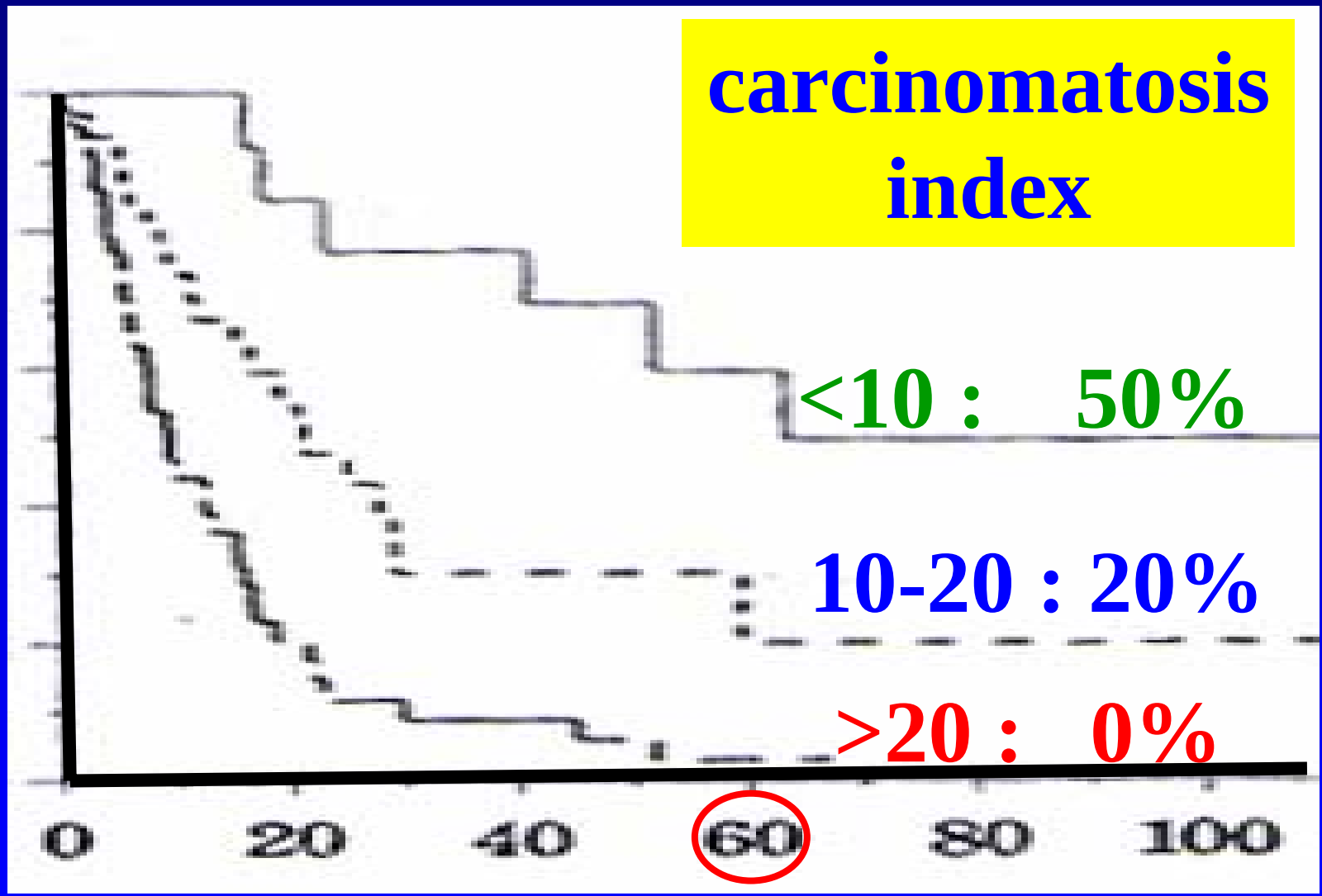
Verwaal, J Clin Oncol 2003

HIPEC: 5 year survival



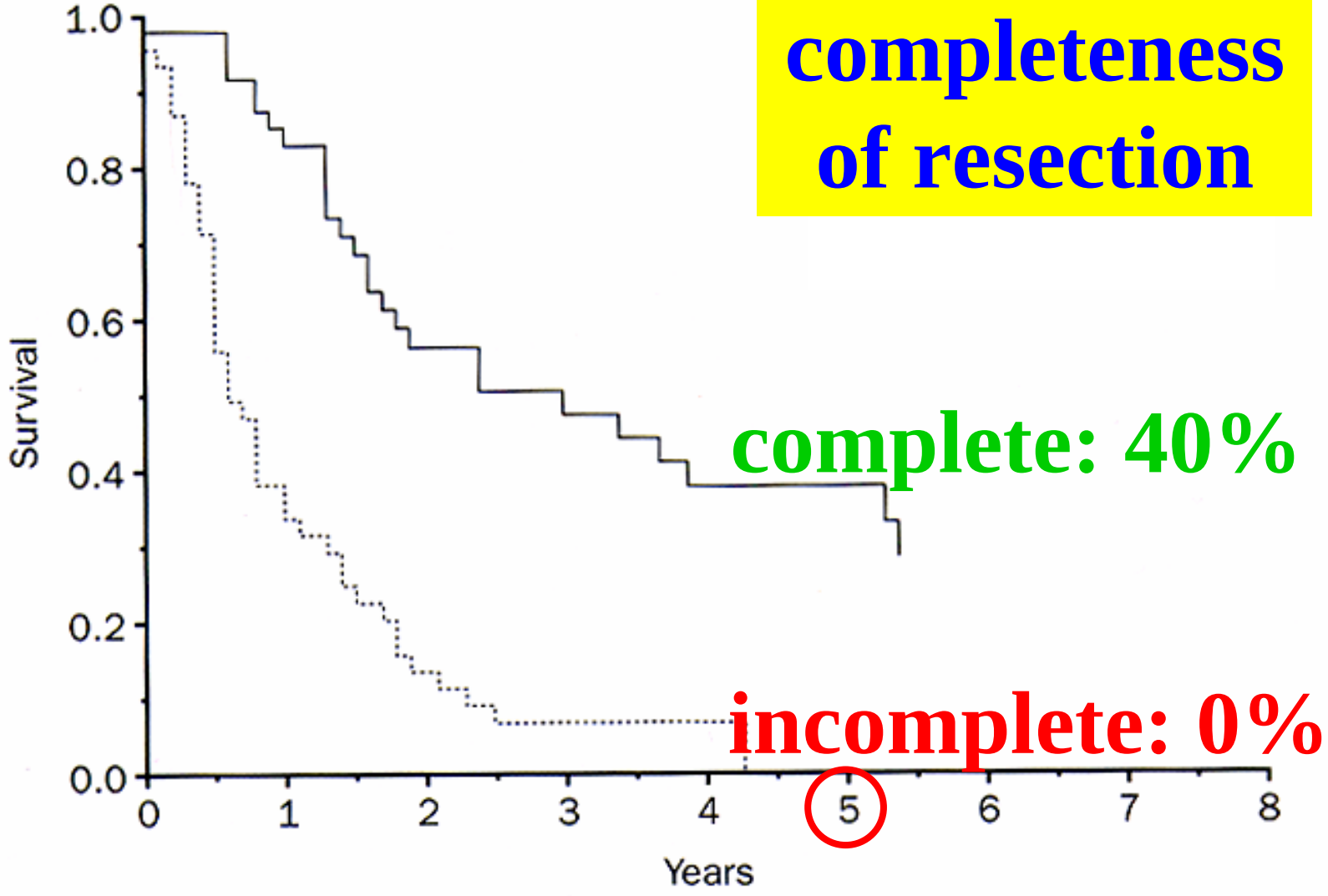
Verwaal, J Clin Oncol 2003

HIPEC: 5 year survival



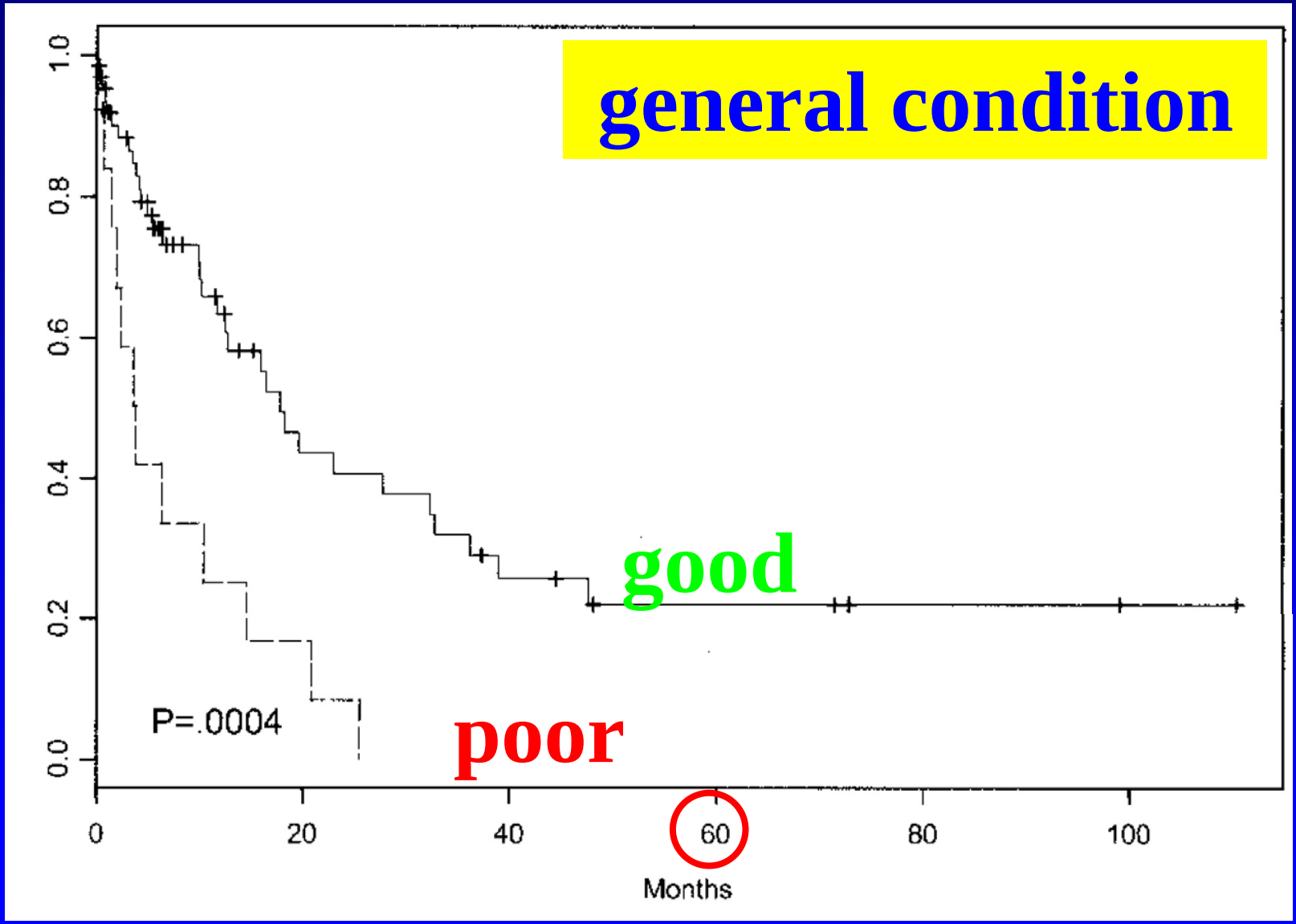
Sugarbaker Cancer Chemoth Pharmac, 1999

HIPEC: 5 year survival



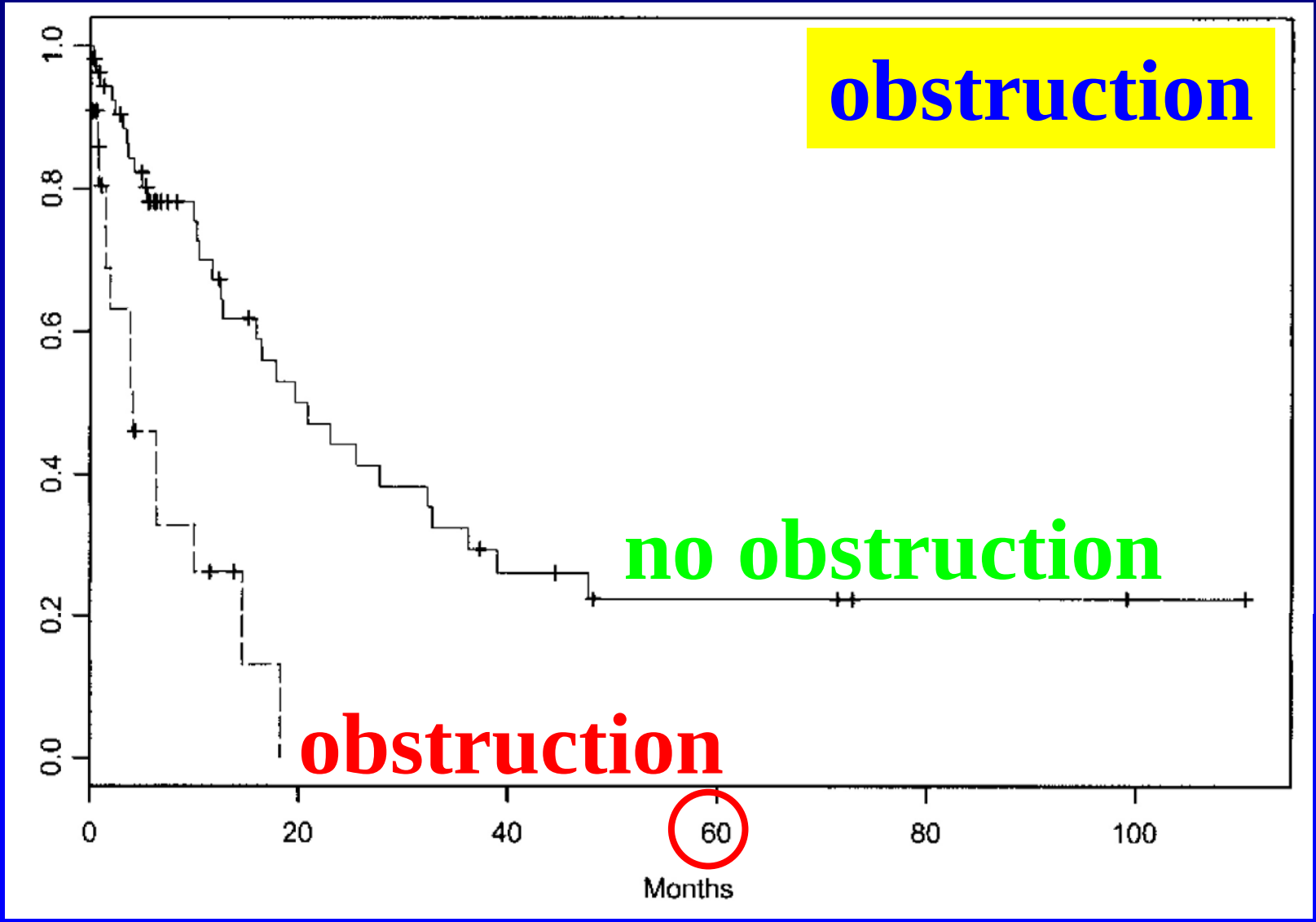
Sugarbaker Cancer Chemoth Pharmac, 1999

HIPEC: 5 year survival



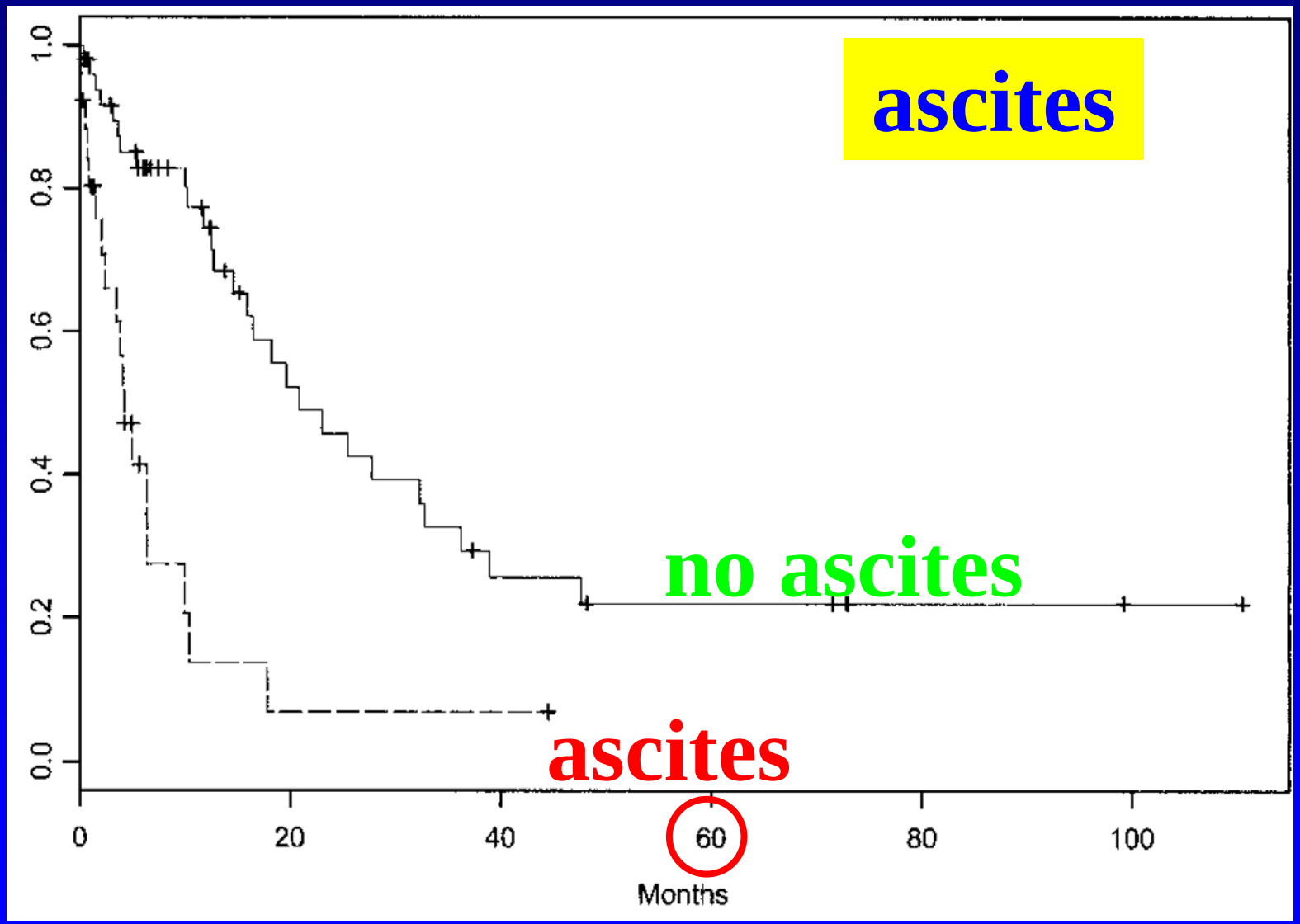
Shen, Ann Surg Oncol 2004

HIPEC: 5 year survival



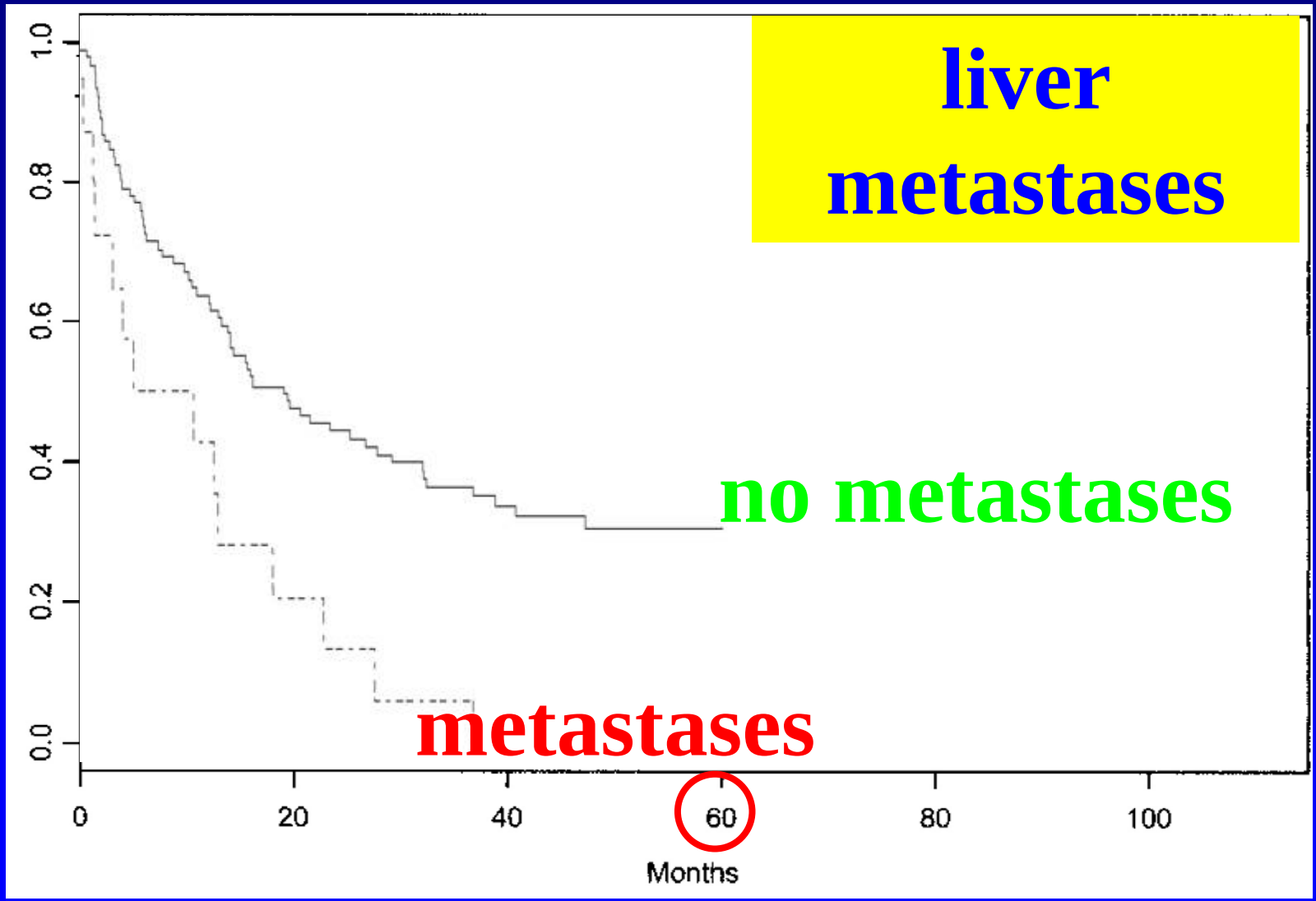
Shen, Ann Surg Oncol 2004

HIPEC: 5 year survival



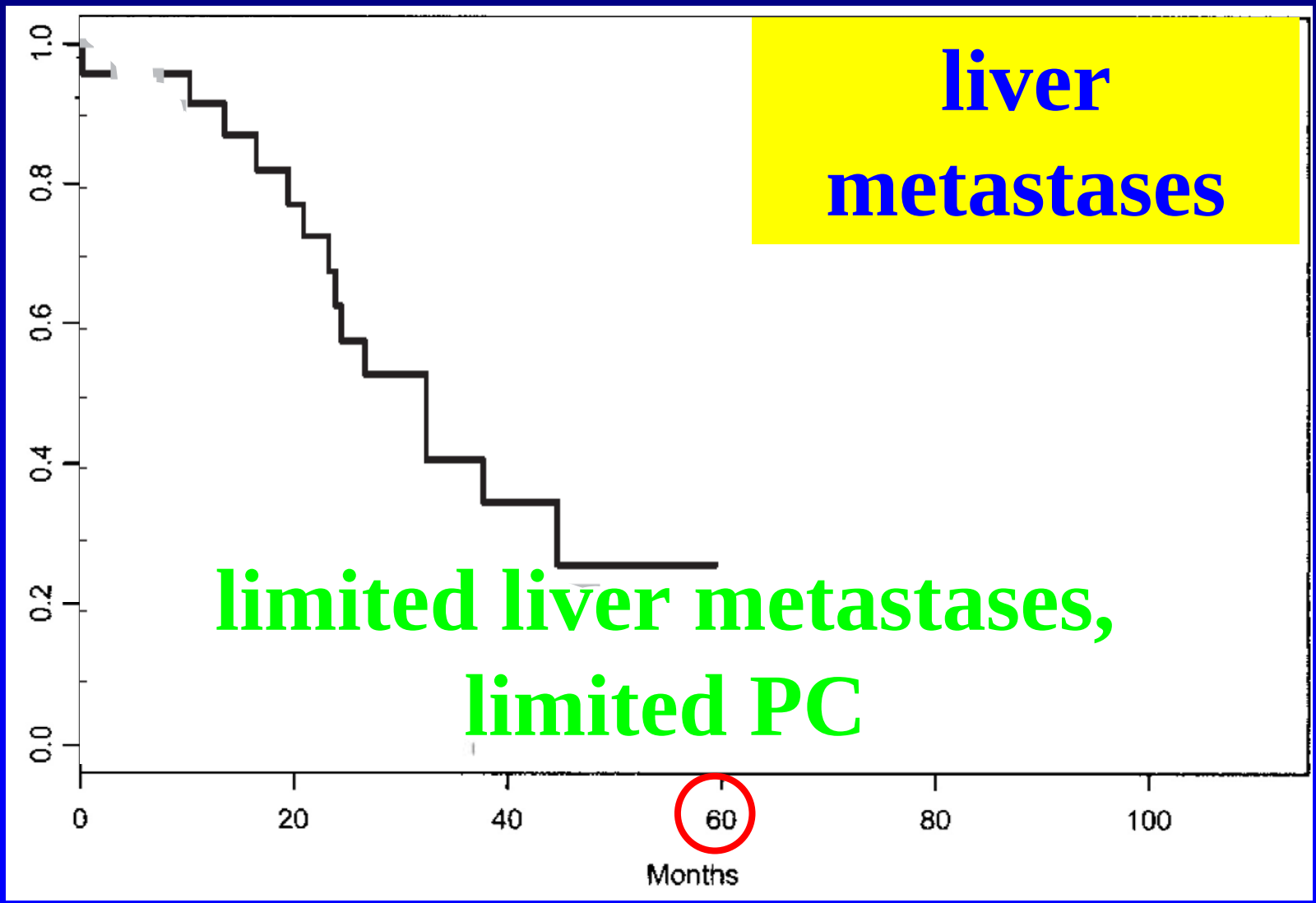
Shen, Ann Surg Oncol 2004

HIPEC: 5 year survival



Shen, Arch Surg 2003

HIPEC: 5 year survival



Elias, EJSO, 2006

HIPEC for colorectal carcinomatosis: results

- complications
- survival
- quality of life

HIPEC: quality of life

- quality of life decreased for 3 months
- 87% of long-time survivors: good/excellent quality of life

Verwaal 2004 Schmidt 2005 McQuellon 2003

Cytoreduction and HIPEC for colorectal carcinomatosis

- introduction
- technique
- results
- indications

HIPEC for colorectal carcinomatosis: indications

- good general condition
- biological age < 70 years
- no ascites
- no obstruction
- no or limited liver metastases
- motivation !

HIPEC for colorectal carcinomatosis: indications

- Final decision is taken during the operation!

- limited carcinomatosis (index < 20)
- complete resection possible

Cytoreduction and HIPEC for colorectal carcinomatosis conclusions

- major surgery, morbidity and mortality
- survival benefit (randomised trial)
- indicated in carefully selected patients

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http://www.drmulier.com/