

**ADVANCED PRACTICE PROVIDER**

**Peritoneal Carcinomatosis: The Good, the Bad, and the Ugly** January 17

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04:00

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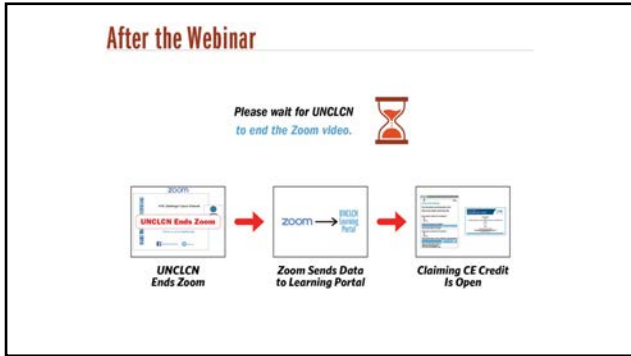
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**Our Presenter**

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**5.** Surgical Oncologist new to UNC

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**Our Presenter**

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**5.** Surgical Oncologist new to UNC

**4.** Manages and treats complex GI and skin/soft tissue malignancies as well as performs HIPEC

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**5.** Surgical Oncologist new to UNC

**4.** Manages and treats complex GI and skin/soft tissue malignancies as well as performs HIPEC

**3.** Participates in clinical trial enrollment with the Southwest Oncology Group

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**Our Presenter**

5. Surgical Oncologist new to UNC
4. Manages and treats complex GI and skin/soft tissue malignancies as well as performs HIPEC
3. Participates in clinical trial enrollment with the Southwest Oncology Group
2. Board certified by the American Board of Surgery in general surgery

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**Our Presenter**

5. Surgical Oncologist new to UNC
4. Manages and treats complex GI and skin/soft tissue malignancies as well as performs HIPEC
3. Participates in clinical trial enrollment with the Southwest Oncology Group
2. Board certified by the American Board of Surgery in general surgery
1. Enjoys reading, history, triathlons, and Alabama football

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Cytoreductive surgery and Hyperthermic Intraperitoneal Chemotherapy (HIPEC) are used in combination to treat peritoneal metastases.

(A) True

(B) False

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Cytoreductive surgery and Hyperthermic Intraperitoneal Chemotherapy (HIPEC) are used in combination to treat peritoneal metastases.

True  0%

False  0%

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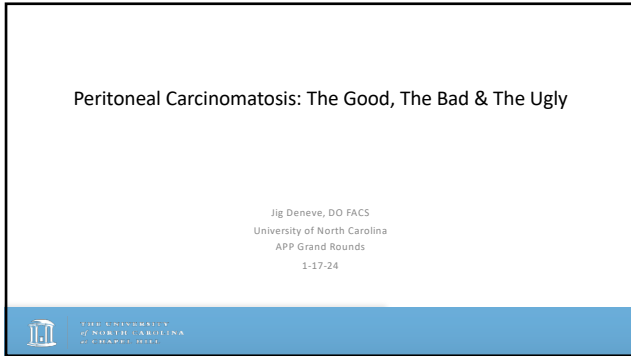
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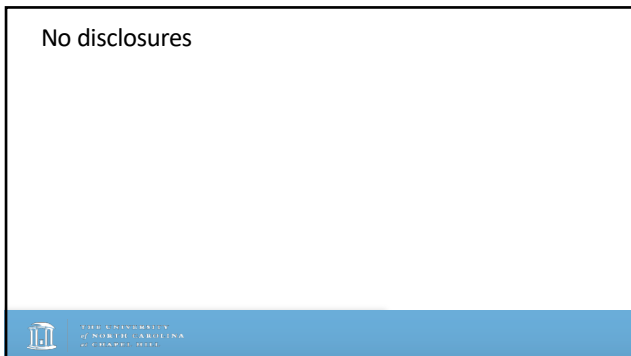
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Recommended treatment for malignant-related ascites includes all of the following except:

- Diuretics 0%
- HIPEC hyperthermic intraperitoneal chemotherapy 0%
- Paracentesis 0%
- PIPAC, pressurized intraperitoneal chemotherapy 0%
- PV Shunt 0%

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Cytoreduction and hyperthermic intraperitoneal chemotherapy (HIPEC) offer a potential cure for carcinomatosis. HIPEC is characterized by all of the following except:

- Heat is synergistic with chemotherapy 0%
- High regional concentration of chemotherapy/low systemic toxicity 0%
- Maximum tissue penetration of 3-5 mm 0%
- Short learning curve with low morbidity 0%
- Should be performed at high-volume centers 0%

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Peritoneal Carcinomatosis

- Background
- Anatomy
- Pathophysiology
- CRS/HIPEC
- Unresectable



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### Natural History

- Pseudomyxoma Peritonei Syndrome<sup>1</sup>
  - Ascites
  - Malnutrition
  - Malignant obstruction
- Poor prognosis<sup>2,3</sup>
  - OS ~5 months untreated
  - ~5-15 months with palliative therapy



1-Eur J Surg Oncol 2006;32(6):644-7  
2-World J Gastroenterol 2012;18:5489-94  
3-Ann Oncol 2011;22:2250-6

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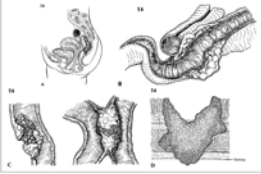
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### Peritoneal Carcinomatosis

- Risk Factors
  - Local advanced tumors (T4)
  - Histology (mucinous, signet ring)
  - Perforated tumors
  - Nodal stage
  - Incomplete resection



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### Peritoneal Surface Malignancies

- Appendix
  - Pseudomyxoma peritonei (Jelly Belly)
    - 2-4 cases/million/year
- Colorectal Cancer
  - 3<sup>rd</sup> most common malignancy in the world
    - 1.4 million diagnosed 2012<sup>1</sup>
  - Peritoneum
    - 2<sup>nd</sup> most common site of recurrence<sup>2</sup>
    - 25% of all recurrences
- Other: Ovary/Mesothelioma/Gastric/DSRCT

1-Int J Cancer, 2014;136:359-86  
2-Int J Colorectal Dis 2015;30:205-12

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**EVOCAPE-1**

Natural history of peritoneal carcinomatosis from nongynecologic malignancies  
 Olivier Glehen, MD\*, Denis Orlinsky, MD\*,  
 Annie Claude Boujard, MD\*,  
 François Noël Gilly, PhD, MD\*  
\*Cancer Research Programme, Univ. Bordeaux, France  
 \*\*Cancer Research Programme, Univ. Bordeaux, France  
 \*\*\*Cancer Research Programme, Univ. Bordeaux, France  
 \*\*\*\*Cancer Research Programme, Univ. Bordeaux, France  
 \*\*\*\*\*Cancer Research Programme, Univ. Bordeaux, France

**Table 4**  
 Peritoneal carcinomatosis staging

PC staging	Stage 0	Stage 1	Stage 2	Stage 3	Stage 4	Total
Gastric	9	22	22	27	45	125
Colorectal	2	11	27	33	45	118
Pancreas	2	11	13	12	20	58
Unknown	0	1	4	7	31	43
Small bowel	0	1	1	0	2	4
Liver	0	1	2	0	0	3
Pseudomyoma	0	0	2	3	7	12
Mesothelioma	0	0	0	2	5	7
Total	13	47	71	84	155	370

Abbreviation: PC, peritoneal carcinomatosis. Cancer 2000; 88:358-63

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**EVOCAPE 1 - CRC (N=118)**

- Mean age 62.3 years
- Synchronous carcinomatosis (58%)
- Ascites (~30%)
- Bowel Obstruction (19.5%)
- Surgery
  - 75 Rxn of Primary
  - 26 Bypass
  - 24 Biopsy only
- Adjuvant Chemo (39%)
- Median OS 5.2 months

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**Treatment Concerns**

- Often present late/symptomatic
  - Ascites
  - Malnutrition
  - Malignant obstruction
- Difficult to identify imaging
- Treatment options
  - Declining performance status
  - Palliative systemic chemotherapy ineffective
    - D2 progression/2<sup>nd</sup> or 3<sup>rd</sup> line
  - Large volume disease precludes surgery



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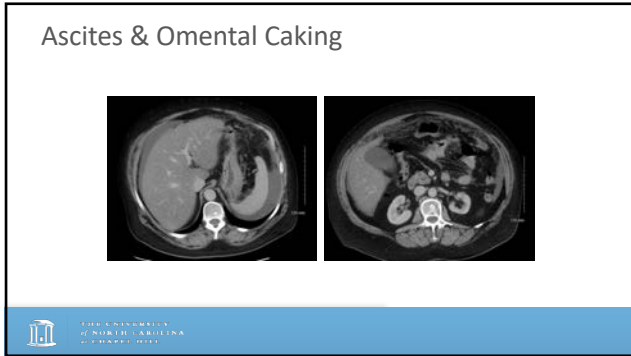
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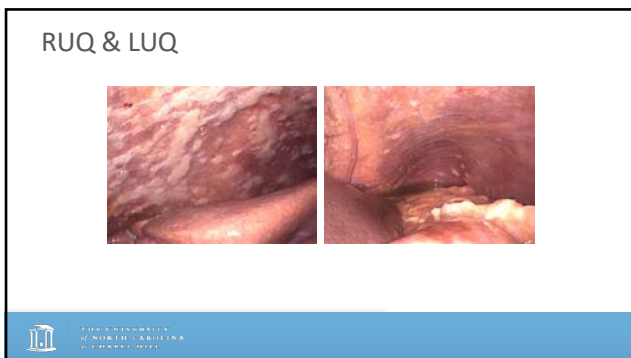
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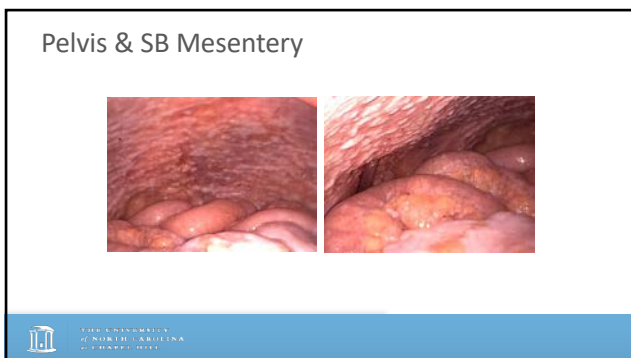
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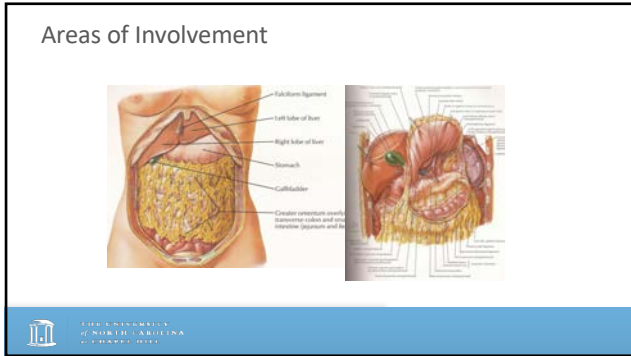
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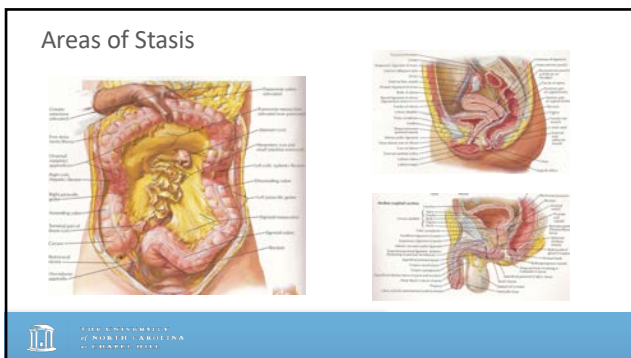
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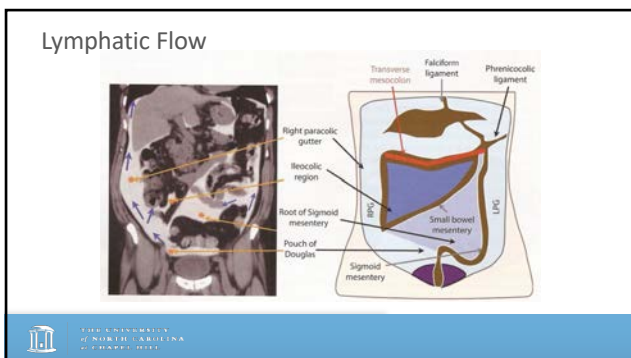
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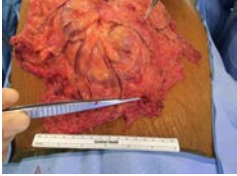
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### Milky Spots

- Accumulations of lymphocytes and macrophages
- Clear particles from abd cavity
- Cancer cells



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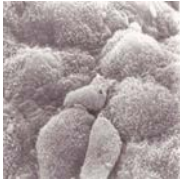
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### Mesothelial Cell

- Structural cell
- Mesoderm
- Serosal hemostasis
  - Intact barrier
  - Initiate inflammation
- Target of cancer cells
  - ECM
  - Hijack mesothelial cells
- Tumor spread
  - Transversal growth
  - Exfoliation/Intraperitoneal spread



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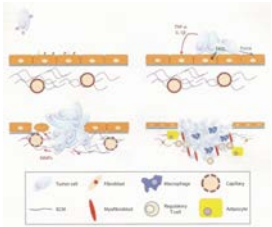
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### Development of Carcinomatosis

- Detachment
- Attachment
- Mesothelial Cell Invasion
- Proliferation
- Inflammation/Evasion
- Angiogenesis



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**Cytoreduction/HIPEC**

- Cytoreduction
  - Aggressive surgical debulking of all visible dz
- HIPEC
  - Chemical destruction of microscopic dz
  - Regional therapy
    - Higher dose than plasma
    - Limited systemic absorption
- PCI/CCR Score<sup>1</sup>
  - Improved survival

Surgery 2012;152:617-24



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**Cytoreductive Surgery**

- Laparotomy (xiphoid-pubis)
- Areas at highest risk of incomplete resection addressed first
- Resection of involved disease sites
- Peritonectomy
- HIPEC after Cytoreduction
- Anastomoses/Diversion



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**Technical Details**

- Open
- Evacuate Ascites/Adhesiolysis
- Calculate PCI Score & CCR score
- Pelvis & pelvic peritoneum (Rectum +/- uterus)
- Diaphragm(s)
- Omentectomy
- Colectomy
- Small bowel & mesentery



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### Peritoneal Cancer Index

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

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

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### Completeness of Cytoreduction

CC-0 CC-1 CC-2 CC-3

No disease Present → 0.25 cm 0.25 cm → 2.5 cm >2.5 cm

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### Mucinous Ascites

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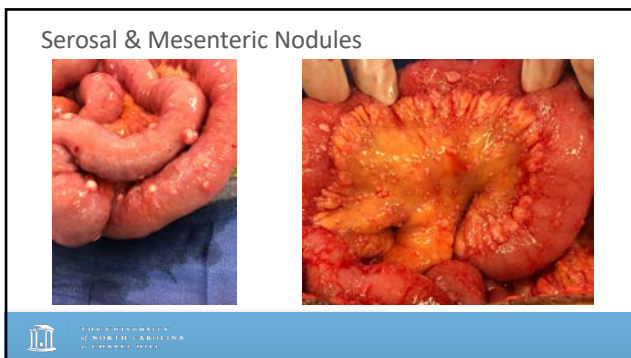
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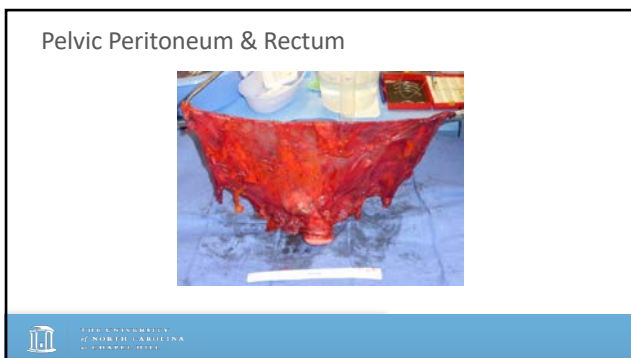
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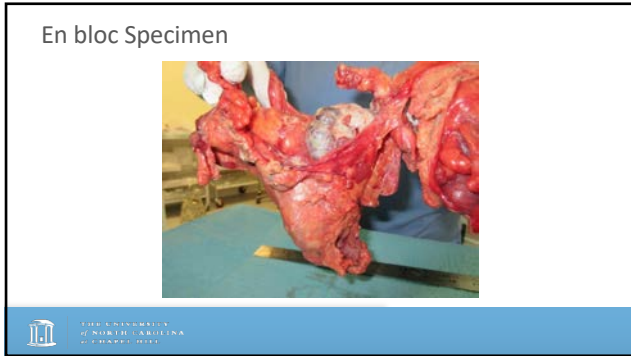
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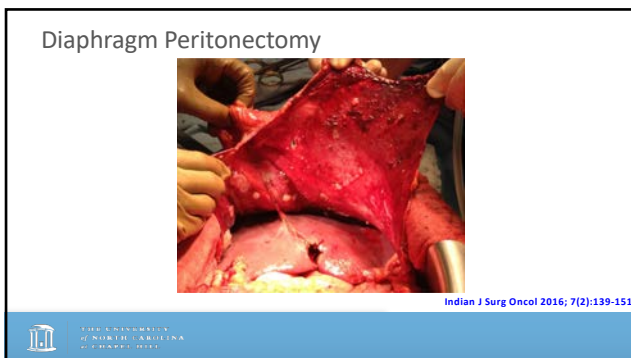
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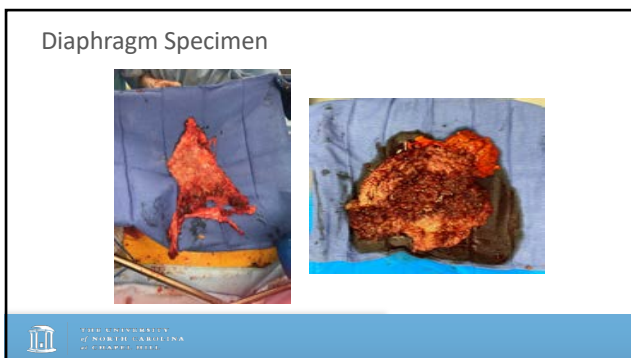
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### R Diaphragm Peritonectomy



Indian J Surg Oncol 2016; 7(2):139-151

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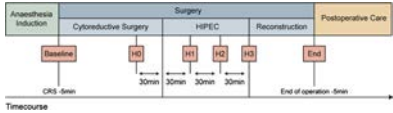
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### Operative Cadence



World J Surg Onc 2014, 12:136

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### Hyperthermic IntraPeritoneal Chemotherapy

- IP Chemotherapy
  - High regional concentration/Low systemic
    - 10-20 fold increase
  - “plasma-peritoneal” barrier
- Tissue Penetration
  - Maximum penetration 3-5 mm<sup>1</sup>
- Hyperthermia (40-42C)
  - Synergistic with intraperitoneal chemotherapy

Cancer Chemo Pharm 1991;28:159-65

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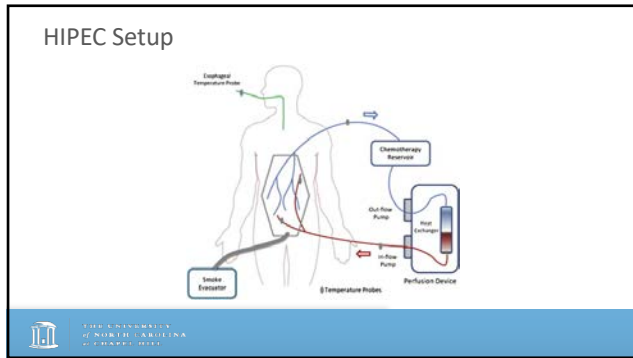
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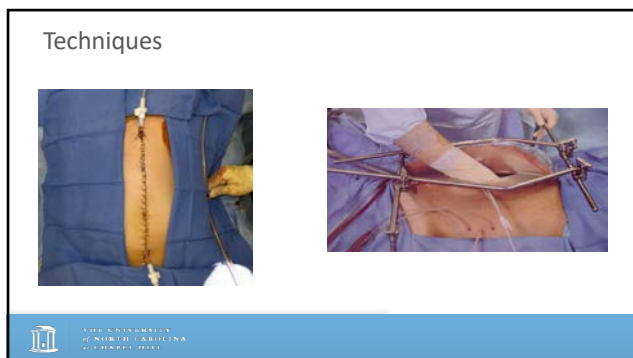
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### HIPEC Agents

- Mitomycin C
- Oxaliplatin
- Cisplatin
- Carboplatin
- Doxorubicin
- Irinotecan
- Paclitaxel
- Docetaxel
- 5-Fluorouracil
- Gemcitabine
- Pemetrexed
- Melphalan




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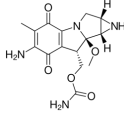

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### Mitomycin C

- Alkylating Antitumor Antibiotics
  - Extracted from *Strep spp.*
- Binds with DNA (cross linking)
  - Inhib DNA synthesis
    - Suppresses cellular RNA
    - Suppresses protein synthesis
- Metabolized predominantly in the liver
- Dose dependent


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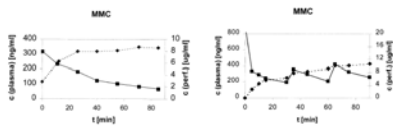
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### Pharmacokinetics of intraperitoneal mitomycin C

S. van Ruth, MD\*, V.J. Verwaal, MD,  
F.A.N. Zoetmulder, MD, PhD

*Department of Surgical Oncology, The Netherlands Cancer Institute/Antoni van Leeuwenhoek Hospital, Pleinlaan 121, Amsterdam 1066 CX, The Netherlands*



Surg Oncol Clin N Am 2003;12:771-780




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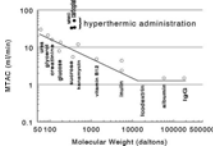
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### Advantages of Mitomycin C

- Noncell cycle specific
  - Directly cytotoxic
- Large molecular weight
  - High plasma/perit AUC
- Rapidly cleared
- Water soluble
- Cytotoxicity enhanced by hyperthermia
- \*Bone marrow toxicity



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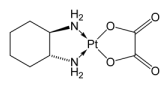
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### Oxaliplatin

- Platinum based antineoplastic
- Inhibits DNA synthesis
  - Forms inter- and intra-strand cross links
  - Prevents DNA replication/transcription
- IP Oxali ~5x > IV dose
- T<sup>1/2</sup> 29 minutes
- Carrier Dependent
- Volume Dependent



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### Advantages of Oxaliplatin

- Large molecular weight 397 daltons
- Administered with 5-FU/Leucovorin
- Less volume of perfusate
- Short perfusion (30 min)
- Cytotoxicity enhanced by hyperthermia
- \*Thrombocytopenia/neutropenia
- \*Hemorrhage

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ASPSM Consensus Guidelines

Ann Surg Oncol (2014) 21:1501–1505  
DOI 10.1245/s10434-013-3061-z


Annals of SURGICAL ONCOLOGY  
www.annals-surgical-oncology.com

REVIEW ARTICLE – GASTROINTESTINAL ONCOLOGY

**Consensus Guidelines from The American Society of Peritoneal Surface Malignancies on Standardizing the Delivery of Hyperthermic Intraperitoneal Chemotherapy (HIPEC) in Colorectal Cancer Patients in the United States**

K. Turaga<sup>1</sup>, F. Levine<sup>2</sup>, R. Barone<sup>3</sup>, R. Sica<sup>4</sup>, N. Petrelli<sup>5</sup>, L. Lambert<sup>6</sup>, G. Nash<sup>7</sup>, M. Morse<sup>8</sup>, R. Adhel-Mish<sup>9</sup>, H. R. Alexander<sup>9</sup>, F. Attiye<sup>10</sup>, D. Bartlett<sup>11</sup>, A. Bastidas<sup>12</sup>, T. Blazer<sup>13</sup>, Q. Chu<sup>14</sup>, K. Chung<sup>15</sup>, L. Dominguez-Parra<sup>16</sup>, N. J. Espat<sup>17</sup>, J. Foster<sup>18</sup>, R. Fournier<sup>19</sup>, R. Garcia<sup>20</sup>, M. Goodman<sup>21</sup>, N. Hanna<sup>22</sup>, L. Harrison<sup>23</sup>, R. Hofer<sup>24</sup>, M. Holtzman<sup>25</sup>, J. Konecny<sup>26</sup>, D. Labow<sup>27</sup>, B. Li<sup>28</sup>, A. Lowy<sup>29</sup>, P. Mansfield<sup>30</sup>, E. Ong<sup>31</sup>, G. Parnicij<sup>32</sup>, J. Pignatelli<sup>33</sup>, M. Quinn<sup>34</sup>, R. Royce<sup>35</sup>, G. Sathya<sup>36</sup>, A. Sardi<sup>37</sup>, P. Shea<sup>38</sup>, J. Skitzki<sup>39</sup>, J. Spellman<sup>40</sup>, J. Stewart<sup>41</sup>, and J. Esquivel<sup>42</sup>

Ann Surg Oncol 2014;21:1501-1505



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ASPSM Consensus Guidelines

**TABLE 2** American Society of Peritoneal Surface Malignancies standardized HIPEC delivery in patients with colorectal cancer with peritoneal dissemination

1	HIPEC method	Closed
2	Drug	Mitomycin C
3	Dosage	40 mg
4	Timing of drug delivery	30 mg at time 0; 10 mg at 60 min
5	Volume of perfusate	3 L
6	Inflow temperature	42 °C
7	Duration of perfusion	90 min



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**Institutional Learning Curve of Cytoreductive Surgery and Hyperthermic Intraperitoneal Chemoperfusion for Peritoneal Malignancies**

Patrick M. Palanca, MD<sup>1</sup>, Ying Ding, PhD<sup>2</sup>, Jordan M. Kass, BA<sup>3</sup>, Lekshmi Ramalingam, MD<sup>4</sup>, Heather Jones, MPA-C<sup>5</sup>, Melissa E. Hogg, MD<sup>6</sup>, Amer H. Zureicki, MD<sup>7</sup>, Matthew P. Holtzman, MD<sup>8</sup>, James Pignatelli, MD<sup>9</sup>, Steven Ahrens, MD<sup>10</sup>, Barbara J. Goh, MD<sup>11</sup>, David L. Bartlett, MD<sup>12</sup>, and Haroon A. Choudry, MD<sup>13</sup>

<sup>1</sup>Division of Surgical Oncology, University of Pittsburgh Medical Center, Pittsburgh, PA; <sup>2</sup>Department of Biostatistics, University of Pittsburgh, Pittsburgh, PA

- Single center, retrospective review
- 370 patients
  - Appendiceal/Meso/Gastric (Colon-excluded)
- RA-SPRT
  - Learning curve
  - Incomplete CRS
  - Severe morbidity
- Risk Adjusted-Cumulative Average Probability
  - 1 & 2 yr PFS/OS

Ann Surg Onc 2015;22:1673-79



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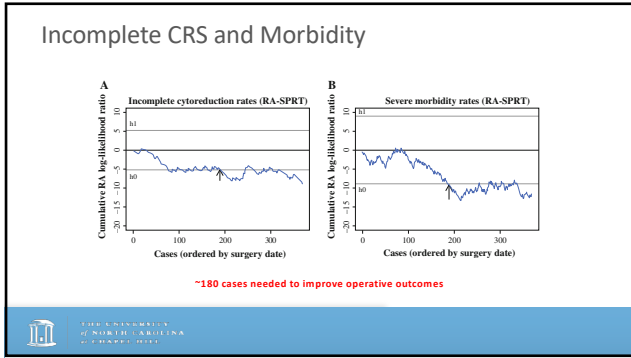
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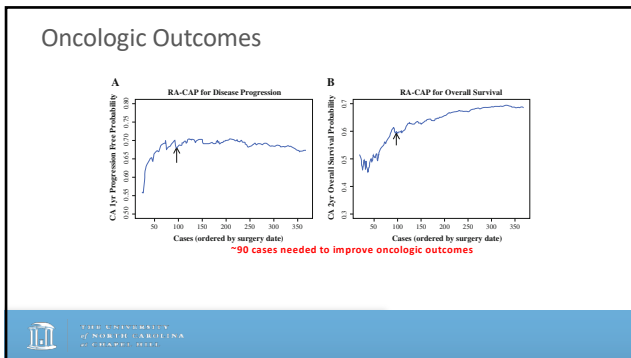
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### The Chicago Consensus on Peritoneal Surface Malignancies: Standards

Chicago Consensus Working Group

**TABLE 1.** Recommended Case Numbers for Individuals Undergoing Cytoreductive Surgery Training

Type of Procedure	Recommended Case No.
Overall cytoreductive surgery cases	20
Diaphragmatic peritonectomy	5
Pelvic peritonectomy	5
Intraperitoneal chemotherapy	5

Cancer 2020; 126:2516-2524

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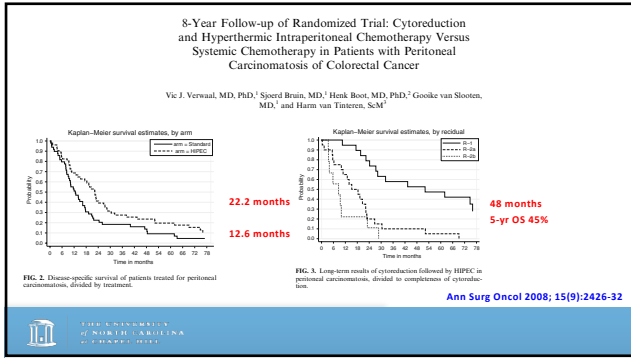
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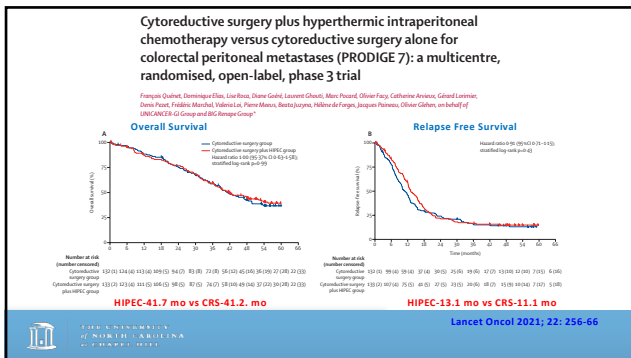
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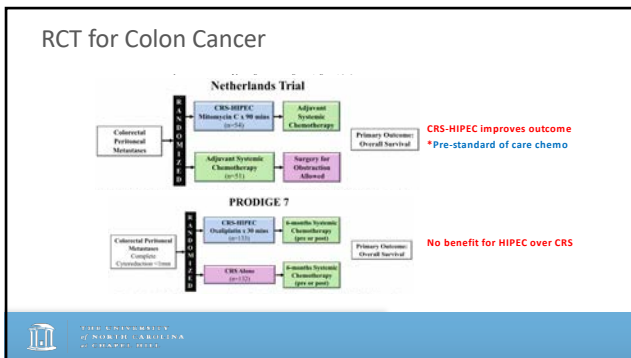





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Current state of affairs 

The panel currently believes that complete cytoreductive surgery and/or intraperitoneal chemotherapy can be considered in experienced centers for selected patients with limited peritoneal metastases for whom R0 resection can be achieved. However, the significant morbidity and mortality associated with HIPEC, as well as the conflicting data on clinical efficacy, make this approach very controversial.



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Chicago Consensus Guidelines 



 **Cancer 2020; 126(11): 2534-2540**



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- Mesothelioma-Alexander (Rutgers)
- CRC-MMC (Foster)
- Gastric-Badgwell (MDACC)
- High Volume/Unresectable PC
  - Laparoscopic-Deneve (UTHSC/UNC)
  - Bi-Directional-Lambert (Utah)
- PIPAC-Roof/Lee (City of Hope/Stanford)
- Adjuvant HIPEC-Nash (MSKCC)
- Organoids-Levine/Votonopolous (Wake Forest)



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### Regional Therapy for Palliation

- What about patients who are not CRS/HIPEC candidates
  - High volume disease (CCR 2/3)
  - Refractory malignant ascites
  - Unable to tolerate CRS/HIPEC



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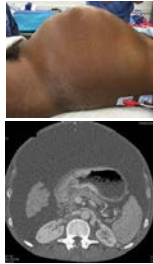
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### Malignant Ascites

- Pathogenesis
  - Lymphatic obstruction
  - Increased capillary permeability
- Diuretics
- Repeated paracentesis
- Peritoneovenous shunts
- Laparoscopic HIPEC



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### Case Study

- 58 yo Caucasian female
- RLQ pain 9/2017
  - Colonoscopy 9/25/17-R sided colon cancer
    - Poorly differentiated adenocarcinoma
    - Signet ring cells
    - MSI stable
  - Ascites
- Paracentesis x 2
  - Cytology-positive for adeno
- CEA >400
- FOLFOX x 6 cycles
- CT-Peritoneum only, No Liver/Lung Metastasis



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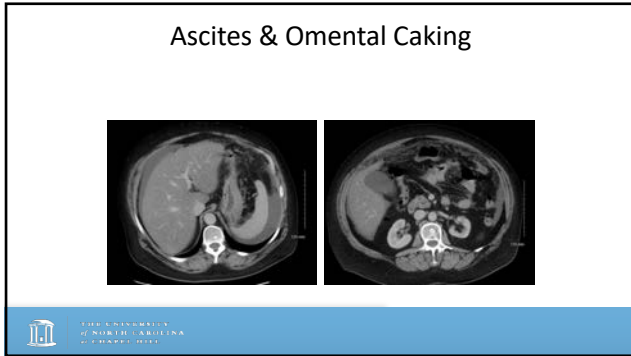
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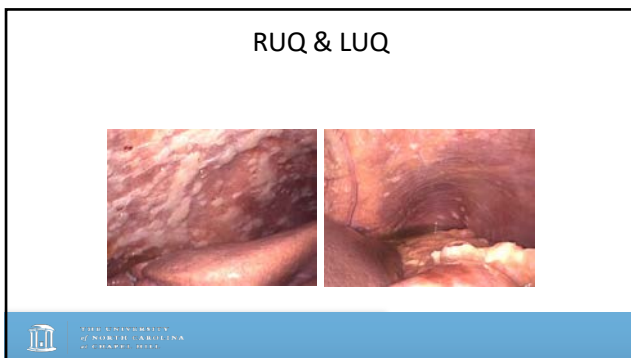
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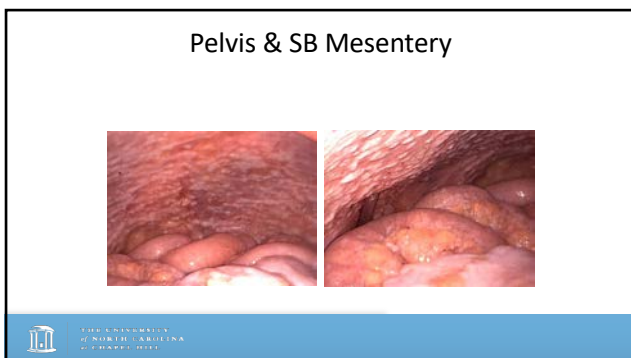
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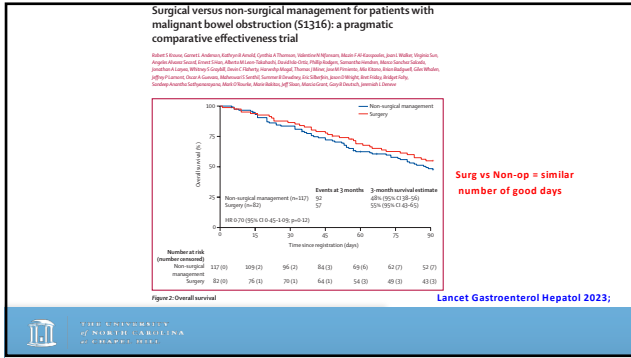
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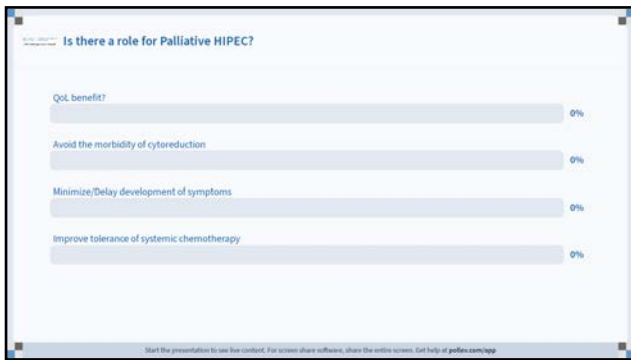
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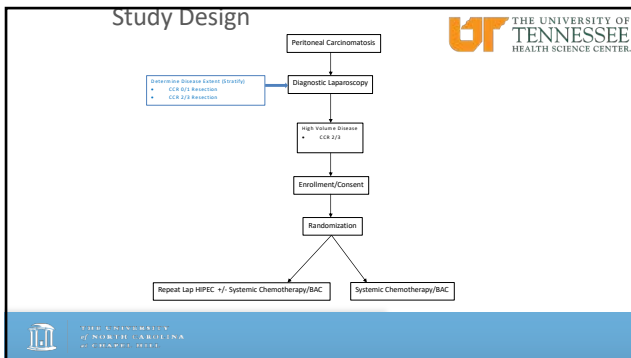
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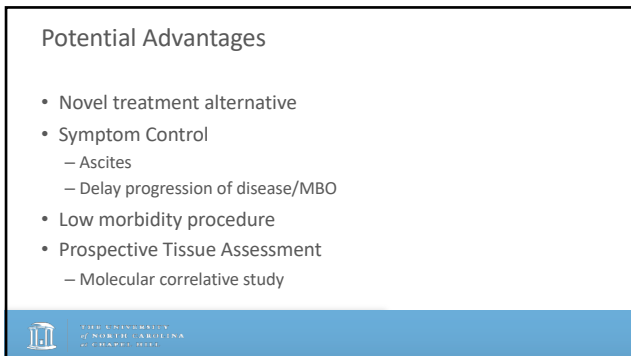
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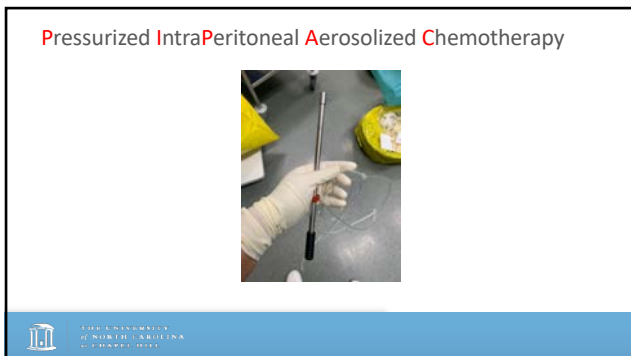
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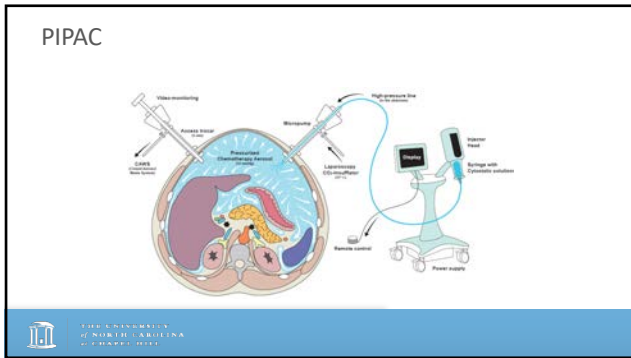
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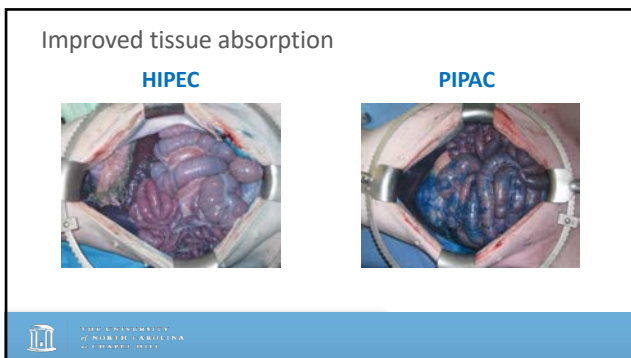
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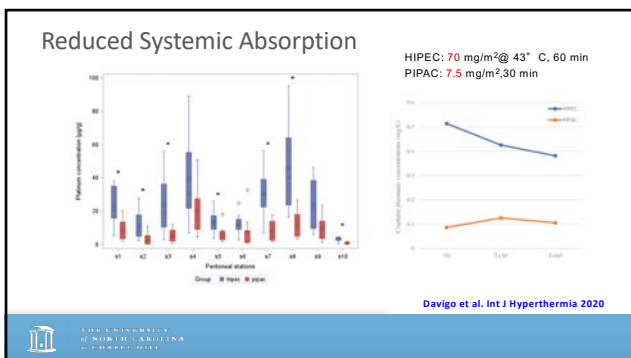
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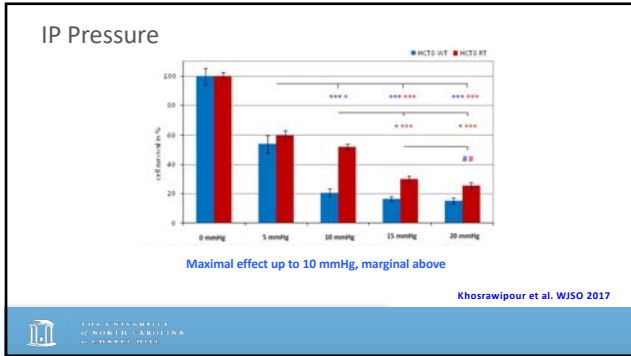
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### Safety and Efficacy of Oxaliplatin Pressurized Intraperitoneal Aerosolized Chemotherapy (PIPAC) in Colorectal and Appendiceal Cancer with Peritoneal Metastases: Results of a Multicenter Phase I Trial in the USA

Mustafa Raouf, MD<sup>1</sup>, Richard L. Whelan, MD<sup>2</sup>, Kevin M. Sullivan, MD<sup>3</sup>, Christopher Raad, MS<sup>4</sup>, Paul H. Frankel, PhD<sup>5</sup>, Sarah E. Cook, PhD<sup>6</sup>, Katherine Yimley, BS, CC RP<sup>7</sup>, Melissa King, CNS<sup>8</sup>, Marwan Fakh, MD<sup>9</sup>, Joseph Chao, MD<sup>10</sup>, Deon Lim, MD<sup>11</sup>, Yanghee Woo, MD<sup>12</sup>, Isaac Benjamin Paz, MD<sup>13</sup>, Michael Lew, MD<sup>14</sup>, Mchaela Cristina, MD<sup>15</sup>, Laura Rodriguez-Rodriguez, MD<sup>16</sup>, Yunna Fong, MD<sup>17</sup>, Rebecca Myers Thomas, MD<sup>18</sup>, Sue Chang, MD<sup>19</sup>, Danielle Deperalta, MD<sup>20</sup>, Amit Merches, MD<sup>21</sup>, and Thanh H. Dellinger, MD<sup>22</sup>

- Phase 1 trial, City of Hope
- 12 patients
- 3 cycles
- 90 mg/m<sup>2</sup> Oxali with 5-FU/LV
- 12 mo OS
- Safe, feasible and efficacious

Ann Surg Oncol 2023

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### Conclusion

- Patients are complex/Multidisciplinary management
- ~100 centers in the United States
  - <200 surgeons
  - Increasing need awareness
- Complex procedures
  - Significant learning curve
- Multidisciplinary effort
- Palliative treatment options
  - Laparoscopic HIPEC/PIPAC
  - Malignant ascites/MBO
- RCT difficult
  - US-based RCT
  - Europeans much better
  - Multicenter collaboration

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**Peritoneal carcinomatosis is an aggressive form of disease spread and characterized by the following manifestations:**

- Advanced disease at onset 0%
- Malnutrition 0%
- Malignant ascites 0%
- Progression to malignant obstruction 0%
- All of the above 0%

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**Recommended treatment for malignant-related ascites includes all of the following except:**

- Diuretics 0%
- HIPEC-hyperthermic intraperitoneal chemotherapy 0%
- Paracentesis 0%
- PIPAC-pressurized intraperitoneal chemotherapy 0%
- PV Shunt 0%

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**Cytoreduction and hyperthermic intraperitoneal chemotherapy (HIPEC) offer a potential cure for carcinomatosis. HIPEC is characterized by all of the following except:**

- Heat is synergistic with chemotherapy 0%
- High regional concentration of chemotherapy/low systemic toxicity 0%
- Maximum tissue penetration of 3-5 mm 0%
- Short learning curve with low morbidity 0%
- Should be performed at high-volume centers 0%

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**References**

- Bradwell, B, et al. "Phase II Trial of Laparoscopic Hyperthermic Intraperitoneal Chemoperfusion for Peritoneal Carcinomatosis or Positive Peritoneal Cytology in Patients with Gastric Adenocarcinoma." *Ann Surg Oncol* 2017;24:3838-3844. <https://pubmed.ncbi.nlm.nih.gov/28299504/>
- Chicago Consensus Working Group. "The Chicago Consensus on peritoneal surface malignancies: Management of colorectal metastases." *Cancer* 2020; 126(11): 2534-2540. <https://pubmed.ncbi.nlm.nih.gov/32493270/>
- Chicago Consensus Working Group. "The Chicago Consensus on peritoneal surface malignancies: Standards." *Cancer* 2020; 126:2516-2524. <https://pubmed.ncbi.nlm.nih.gov/32282020/>
- Chua, TC, et al. "Early- and long-term outcome data of patients with pseudomyxoma peritonei from appendiceal origin treated by a strategy of cytoreductive surgery and hyperthermic intraperitoneal chemotherapy." *J Clin Oncol* 2012;30(20):2449-56. <https://pubmed.ncbi.nlm.nih.gov/22474919/>
- Davgo, A, et al. "HPMC versus HIFEC: cisplatin spatial distribution and diffusion in a swine model." *Int J Hyperthermia* 2020;37(1):144-150. doi: 10.1080/02656736.2019.1704891. <https://pubmed.ncbi.nlm.nih.gov/31464046/>
- Efferink, MAG, et al. "Metachronous metastases from colorectal cancer: a population-based study in North-East Netherlands." *Int J Colorectal Dis* 2015;30:205-12. <https://pubmed.ncbi.nlm.nih.gov/25203870/>
- Ferlay, J, et al. "Cancer incidence and mortality worldwide: sources, methods and major patterns in GLOBOCAN 2012." *Int J Cancer*, 2014;136:359-86. <https://pubmed.ncbi.nlm.nih.gov/25220842/>
- Gerrit, L, et al. "Penetration of carboplatin and cisplatin into rat peritoneal tumor nodules after intraperitoneal chemotherapy." *Cancer Chemother Pharmacol* 1993;28:159-65. <https://pubmed.ncbi.nlm.nih.gov/1002460868686/>
- Guasamy, K, et al. "Cytoreductive surgery (CRS) with hyperthermic intraperitoneal chemotherapy (HIPEC) versus standard of care (SOC) in people with peritoneal metastases from colorectal, ovarian or gastric origin: protocol for a systematic review and individual patient data (IPD) meta-analysis of effectiveness and cost effectiveness." *Ann Oncol* 2011;22:2250-6. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3128348/>




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**References**

- Kaji, M, et al. "Anesthesia in patients undergoing cytoreductive surgery with hyperthermic intraperitoneal chemotherapy: retrospective analysis of a single centre three-year experience." *World J Surg Onc* 2014; 12:136. <https://pubmed.ncbi.nlm.nih.gov/24981141/>
- Khoravajpour, V, et al. "Cytotoxic effect of different treatment parameters in pressurized intraperitoneal aerosol chemotherapy (PIPAC) on the in vitro proliferation of human colorectal cancer cells." *World J Surg* 2017. <https://www.biomedcentral.com/annalsurg/13/6/1295/101110184>
- Krouse, RL, et al. "Surgical versus non-surgical management for patients with malignant bowel obstruction (S1316): a pragmatic comparative effectiveness trial." *Lancet Gastroenterol Hepatol* 2023 Oct;8(10):908-918. doi: 10.1016/S2468-1253(23)00191-7. Epub 2023 Aug 1. <https://pubmed.ncbi.nlm.nih.gov/37511267/>
- Marz, L, and Pompiliu Piso. "Treatment of peritoneal metastases from colorectal cancer." *World J Gastroenterol* 2012;18:5489-94. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3629275/>
- Mehta, SS, et al. "Cytoreductive Surgery and Peritonectomy Procedures." *Indian J Surg Oncol* 2016; 7(2):139-151. <https://pubmed.ncbi.nlm.nih.gov/27062704/>
- Quinet, F, et al. "Cytoreductive surgery plus hyperthermic intraperitoneal chemotherapy versus cytoreductive surgery alone for colorectal peritoneal metastases (PRODIGE 7): a multicentre, randomised, open-label, phase 3 trial." *Lancet Oncol* 2021; 22: 235-66. <https://pubmed.ncbi.nlm.nih.gov/33466660/>
- Raed, M, et al. "Safety and Efficacy of Oxaliplatin Pressurized Intraperitoneal Aerosolized Chemotherapy (PIPAC) in Colorectal and Appendiceal Cancer with Peritoneal Metastases: Results of a Multicenter Phase I Trial in the USA." *Ann Surg Oncol* 2023; 30(12): 7814-7824. Published online 2023 Jul 27. doi: 10.1245/s10434-023-13941-2. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC10582297/>
- Sadeghi, B, et al. "Peritoneal carcinomatosis from non-gynecologic malignancies: Results of the EVOCAPE 1 multicentric prospective study." *Cancer* 2000; 88:358-63. First published: 20 November 2000. <https://doi.org/10.1002/ajco.10001> <https://pubmed.ncbi.nlm.nih.gov/10928161/>
- Spilletti, J, et al. "Cytoreductive surgery and HIPEC in recurrent epithelial ovarian cancer: a prospective randomized phase III study." *Ann Surg Onc* 2015 May;22(5):1570-5. doi: 10.1245/s10434-014-4157-9. Epub 2014 Nov 13. <https://pubmed.ncbi.nlm.nih.gov/25191267/>




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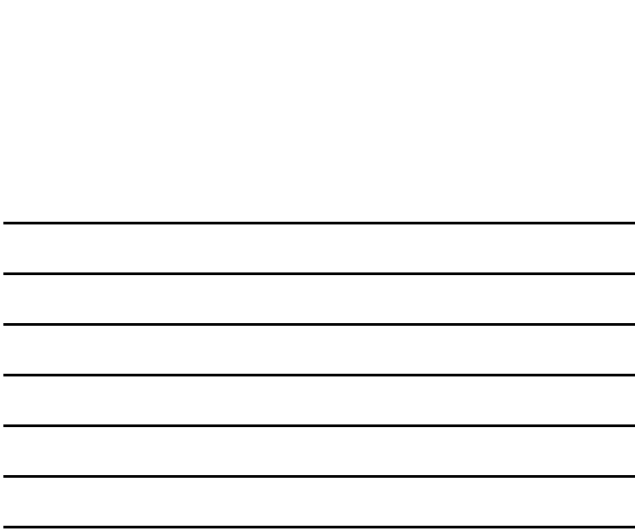


**References**



- Sugarbaker, PH. "The natural history, gross pathology, and histopathology of appendiceal epithelial neoplasms." *Eur J Surg Oncol* 2006;32(6):644-7. <https://pubmed.ncbi.nlm.nih.gov/16414742/>
- Turaga, K, et al. "Consensus guidelines from The American Society of Peritoneal Surface Malignancies on standardizing the delivery of hyperthermic intraperitoneal chemotherapy (HIPEC) in colorectal cancer patients in the United States." *Ann Surg Oncol* 2013;21:1001-1009. <https://pubmed.ncbi.nlm.nih.gov/23293964/>
- van Ruth, S, et al. "Pharmacokinetics of intraperitoneal mitomycin C." *Surg Oncol Clin N Am* 2003;12:771-780. <https://www.sciencedirect.com/S015015910300031-0?via=ihl>
- Van Sweringen HL, et al. "Predictors of survival in patients with high-grade peritoneal metastases undergoing cytoreductive surgery and hyperthermic intraperitoneal chemotherapy." *Surgery* 2012;152:617-24; discussion 624-5. 10.1016/j.surg.2012.07.027. <https://pubmed.ncbi.nlm.nih.gov/22477302/> <https://doi.org/10.1053/j.surg.2012.07.027>
- Verwaal, VL, et al. "5-year follow-up of randomized trial: cytoreduction and hyperthermic intraperitoneal chemotherapy versus systemic chemotherapy in patients with peritoneal carcinomatosis of colorectal cancer." *Ann Surg Oncol* 2008; 15(9):2426-32. <https://pubmed.ncbi.nlm.nih.gov/18521469/>



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Considerations for Pharmacogenomic Testing in Cancer Patients  
Amber Cipriani, PharmD, BCOP

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