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Results of an international expert panel for appropriate and necessary processes of care for gastric cancer. *Natalie Coburn,* Rajini Seevaratnam,* Robin McLeod,† Lucy Helyer,‡ Calvin Law,* Carol Swallow,† Lawrence Paszat,† Jill Tinmouth,* Roberta Cardoso,* Alyson Mahar,§ and the Gastric Cancer Processes of Care Expert Panel.* From the *Sunnybrook Health Sciences Centre, the †University of Toronto, Toronto, Ont., ‡Dalhousie University, Halifax, NS, and §Queen's University, Kingston, Ont.

Introduction: Survival for gastric cancer (GC) is markedly worse in the West than the East, yet components of care affecting survival have not been well defined. **Methods:** Using a RAND/UCLA Appropriateness Method, an international, multidisciplinary expert panel of 16 physicians scored 2000 scenarios for GC treatments for appropriateness and necessity. Agreement was defined as 11 of 16 panelists scoring the statement as appropriate or necessary. **Results:** Scoring showed the necessity of CT abdomen/pelvis for preoperative assessment, whereas CT chest, abdominal ultrasound, barium swallow and abdominal MRI were indeterminate. Routine PET is inappropriate. A diagnostic laparoscopy before initiation of curative-intent treatments is appropriate, with the exception of early gastric cancer. Sending ascites/peritoneal washings for hematoxylin and eosin examination as part of a diagnostic laparoscopy was found appropriate, whereas immunohistochemistry, polymerase chain reaction and immunoassay examinations were indeterminate. There was strong support for laparoscopic resection by surgeons with experience in both advanced laparoscopic surgery and gastric cancer management, and for a D2 lymph node dissection in patients with advanced, nonmetastatic gastric cancer. Involvement of a multidisciplinary team before treatment initiation was felt to be necessary. In locally advanced GC (> T2N0M0 AJCC7), it is necessary to consider adjunctive therapies. For patients with metastatic disease, nonsurgical management should be sought in the absence of major symptoms. Nonemergent, curative intent resections should be performed in hospitals with an annual volume of more than 15 cases per year and by surgeons with a volume of more than 6 per year. **Conclusion:** Treatment of GC has evolved substantially, requiring new recommendations for optimal processes of care for these patients.

Resection of abdominal desmoid tumours: Is there a benefit? *Edward D. McAlister, Saquib Siddique, Amanda Cannell, Terri Berk, Rita Kandel, Carol J. Swallow, Rebecca A. Gladdy.* From the Mount Sinai Hospital and Princess Margaret Hospital, University of Toronto, Toronto, Ont.

Introduction: Desmoid tumours are locally aggressive neoplasms occurring in patients sporadically or with familial adenomatous polyposis (FAP), and can be associated with surgical trauma or recent pregnancy. High recurrence rates after resection paired with an often indolent course have resulted in controversy over the optimal management of these tumours. Here we report on the multidisciplinary management of abdominal wall and intra-abdominal desmoid tumours, particularly as it relates to surgical resection. **Methods:** A retrospective chart review was undertaken to evaluate clinical course for patients presenting to Mount Sinai Hospital or Princess Margaret Hospital with abdominal wall or intra-abdominal desmoid tumours from 1980 to 2009. **Results:** Of 187 patients identified, 92 had surgery as part of their treatment, whereas 95 were managed nonoperatively with combinations of chemotherapy, radiotherapy, hormonal therapy or with observation alone. Eighty desmoid patients had FAP, of whom 34 were managed with surgery. Recurrence rates after surgery were not significantly different whether an R0 or R1 resection had been performed. The recurrence rate for sporadic desmoids was 10%, compared with 51% in patients with FAP ($p < 0.001$). Seven of 44 observed patients experienced resolution of their disease without treatment. There were 5 disease-related deaths in the surgical group and 1 in the nonsurgical group (NS). There was a trend toward lower overall survival in FAP patients managed with surgery. **Conclusion:** In selected patients, death owing to desmoid tumour is uncommon regardless of treatment modality, and some patients regress with no treatment. Recurrence after surgery is more likely in FAP patients and does not seem to be affected by margin status.

Diagnostic accuracy of MRI for assessment of T-category, nodal metastases and circumferential resection margin involvement in patients with rectal cancer: a meta-analysis. *Eisar Al-Sukhni,* Laurent Milot,† Mark Fruitman,‡ Joseph Beyene,§ Charles Victor,¶ Selina Schmocker,* Robin McLeod,* Erin Kennedy.** From the *Department of Surgery, Mount Sinai Hospital, the †Department of Diagnostic Imaging, Sunnybrook Health Sciences Centre, the ‡Department of Diagnostic Imaging, St. Joseph's Health Centre, Toronto, the §Department of Clinical Epidemiology and Biostatistics, McMaster University, Hamilton, and the ¶Institute for Clinical Evaluative Sciences, Toronto, Ont.

Introduction: Magnetic resonance imaging is increasingly being used for local staging of rectal cancer. The objective of this study was to perform a meta-analysis to determine the accuracy of phased array magnetic resonance imaging for T-category (T1–2 v. T3–4), nodal metastases and circumferential resection margin

(CRM) involvement in patients with primary rectal adenocarcinoma. **Methods:** MEDLINE, EMBASE and Cochrane databases were searched using combinations of keywords relating to rectal cancer and MRI. Reference lists of included articles were also hand searched. Article inclusion criteria were original paper published between January 2000 and May 2010, phased array coil pelvic MRI used, reference standard was the pathologic specimen and raw data available to create 2 × 2 contingency tables. Patients who underwent preoperative radiotherapy were excluded. Two reviewers independently extracted data. Sensitivity, specificity and diagnostic odds ratios (DORs) were estimated for each outcome using bivariate random effects modelling and hierarchical summary receiver operating characteristic modelling. **Results:** Fourteen studies were included in the analysis. There was notable clinical and methodological heterogeneity among studies. Magnetic resonance imaging specificity was significantly higher for CRM involvement than for T-category, but there was no significant difference in sensitivity or DOR. Sensitivity, specificity and DOR were lowest for assessment of nodal metastases (Table). **Conclusion:** In this meta-analysis, CRM involvement was most accurately reported on MRI; however, owing to heterogeneity between studies, the confidence intervals were fairly wide. Strategies to improve MRI accuracy for detecting lymph node metastases are required to improve overall preoperative staging of rectal cancer.

Table. Accuracy of phased array magnetic resonance imaging in primary rectal adenocarcinoma

Parameter	Measure; mean (95% CI)		
	Sensitivity	Specificity	DOR
T-category	88 (80–93)	71 (63–79)	18.5 (9.1–37.6)
Lymph node involvement	75 (64–83)	61 (53–69)	4.7 (3.0–7.3)
CRM involvement	82 (54–95)	95 (87–98)	90.4 (12.9–634.8)

CI = confidence interval; CRM = circumferential resection margin; DOR = diagnostic odds ratio.

A patient-centred approach toward wait times in the surgical management of colon cancer in the province of Ontario. *A. Smith,* A. Gillis,** C. Law,* N. Coburn.** From the *Department of Surgical Oncology, Sunnybrook Health Sciences Centre, and the †Department of Surgical Oncology, Princess Margaret Hospital, Toronto, Ont.

Introduction: Ontario has tracked administrative wait times (time from consent to surgery) for cancer surgery since 2005 and has set targets based on priority. Priority 3 cases (invasive disease) have a target of 28 days. Practically, the wait time for patients is much longer, as it begins at the time of diagnosis, which can occur weeks before consent is obtained. The objectives of this study were to calculate the wait time from diagnosis to surgery and to determine variables influencing the ability to achieve the target. **Methods:** A retrospective review was performed of all patients (aged 18–80 yr) diagnosed with colon cancer from Jan. 1, 2002, to Dec. 31, 2008, and treated surgically. Patients with rectal cancer and those receiving neoadjuvant therapy before surgery were excluded. The primary outcome was wait time from surgical consult to surgical date; univariate and multivariate analyses were performed to identify variables contributing to a wait time of more than 28 days. **Results:** In total, 10 223 (46% female)

patients were identified, with a median age of 68 years. The number of patients treated more than doubled over 6 years (2002–2008). Over 50% of patients had a wait time of greater than the target, with a median wait time of 31 (range 0–182) days. On adjusted analysis, rurality, age greater than 65, anesthesia or cardiology consultation, cardiac catheterization (30 d), colonoscopy (23 d), CT (3 d), echocardiogram (9.5 d) and MRI (16 d) had a significant impact, negatively, on wait time. **Conclusion:** Wait times have increased steadily each year, corresponding to the increased volume of patients. Preoperative investigations extend the wait time significantly, but this is not captured with the current administrative approaches to wait time assessment.

Adult extrasosseous Ewing sarcoma (EES): outcomes of multimodality therapy at a specialized centre. *Amy Gillis,* Rebecca Gladdy,* Brendan Dickson,† Carol Swallow.** From the *Departments of Surgical Oncology, Mount Sinai Hospital and Princess Margaret Hospital, and the †Department of Pathology, Mount Sinai Hospital, Toronto, Ont.

Introduction: Extrasosseous Ewing sarcoma (EES) is a rare sarcoma in adults, and outcome data are limited. Whereas resection is recommended as part of multimodality treatment, its role after complete clinical response to chemotherapy and/or radiotherapy is unclear. The objectives of this study were to determine the management and outcomes of patients with EES treated at a specialized sarcoma centre over a 20-year period. **Methods:** A retrospective review was performed of all patients with a confirmed pathologic diagnosis of EES from January 1989 through March 2010. Kaplan–Meier survival curves were constructed and univariate and multivariable analyses performed to identify prognostic variables. **Results:** Thirty-nine patients were identified; their median age at presentation was 34 years. The lower extremities were the most common primary site of the tumour. Thirteen patients (33%) had distant metastases at presentation; 22 patients underwent resection of the primary plus chemotherapy and/or radiotherapy; 17 patients underwent chemotherapy and/or radiotherapy without resection. Chemotherapy (vincristine, adriamycin, cyclophosphamide [VAC] and etoposide [VP-16]/ifosfamide) was given to 95% of patients, radiotherapy to 51%. The mean follow-up time was 36 (range 2–149) months. The 5-year overall survival was 46%; no difference in overall survival was observed in resected versus nonresected groups. During follow-up, 2 patients had local recurrence of their cancer and 4 developed metastases. Of the 4 patients who had a complete clinical response after chemotherapy/radiotherapy and did not undergo resection, none have yet experienced recurrence. Metastatic disease at presentation was the only significant predictor of overall survival in multivariate analysis. **Conclusion:** While we continue to recommend resection of the primary tumour as part of multimodality therapy for adult EES when feasible, these data suggest that a nonoperative approach may be appropriate in a select group of patients who achieve a complete clinical response after chemotherapy/radiotherapy.

The Quality Improvement in Colorectal Cancer Surgery in Local Health Integration Network 4 (QICC-L4) Project. *Marko Simunovic,** Peter Lovrics,* Margherita Cadeddu,* Shawn Forbes,* Stephen Kelly,**

Wesley Stephen,* Franco DeNardi,⁵ Lehana Thabane,[‡] David Musson.[¶] From the *Department of Surgery, McMaster University, the †Department of Surgical Oncology, Juravinski Cancer Centre, Hamilton Health Sciences, and the Departments of ‡Clinical Epidemiology and Biostatistics, §Pathology and Molecular Medicine and ¶Anesthesia, McMaster University, Hamilton, Ont.

Introduction: The QICC-L4 is a surgeon-led, iterative project designed to improve the quality of colorectal cancer surgery. Guiding principles include the need for “system-level excellence,” “supporting surgeons close to relevant points of care” and “regional leadership and local engagement.” **Methods:** Since 2006, 3 workshops have been held with LHIN4 surgeons to discuss quality improvement, review audited data, select quality markers for subsequent audit and select interventions for subsequent implementation. Selected markers include colon cancer perioperative imaging, rectal cancer preoperative imaging, reporting of radial margin distance and rates of positive radial margins. Rates for the first 3 markers should be 100%, and positive margin rates should be below 10%. Recently, 2 new interventions have been successfully piloted: first, the review of preoperative imaging with referring surgeons using an Internet-based platform, and second, a systems event reporting system to review documents following a negative outcome such as local tumour recurrence. All interventions raise awareness of the importance of negative radial margins. Radiologists and pathologists have recently joined the QICC-L4. **Results:** Over 3 iterations, results include the following: colon cancer perioperative imaging has increased (69% to 91%), rectal cancer preoperative imaging has increased (71% to 91%), reporting of radial margin distance has increased (56% to 75%) and rates of positive radial margins have dropped (14% to 10%). **Conclusion:** Despite improvements in measures, quality gaps persist. We plan to evaluate the QICC-L4 relative effectiveness by comparing measures in LHIN4 versus other LHINs in Ontario. A similar project has been launched in breast cancer surgery.

The role of cytoreductive strategies in the treatment of carcinomatosis of colorectal origin. A physician survey. Angela W. Chan, Gitonga Munene, Joel Weaver, Tony MacLean, Jay Easaw, Gil Kaplan, Elijah Dixon. From the Division of General Surgery, University of Calgary, and the Foothills Medical Centre, Calgary, Alta.

Introduction: Even though the efficacy of cytoreduction and heated intraperitoneal chemotherapy (HIPEC) for the treatment of colorectal carcinomatosis has been demonstrated, many patients who may benefit from this treatment are not referred to centres specializing in the treatment of peritoneal cancers. This survey was undertaken to determine physician attitudes toward the role of cytoreduction in the treatment of colorectal carcinomatosis. **Methods:** A survey with demographic information and clinical scenarios was sent out to medical oncologists, gastroenterologists, general surgeons, colorectal surgeons and surgical oncologists within Canada. **Results:** Three mail-outs were sent, with a response rate of 49% (217 respondents). For synchronous colorectal carcinomatosis, 31.4% of respondents favoured systemic therapy alone, 28.6% cytoreduction with HIPEC plus systemic chemotherapy, and 18.9% cytoreduction with HIPEC

alone. For metachronous colorectal carcinomatosis, 48.6% of respondents favoured systemic therapy alone, 27.4% cytoreduction with HIPEC plus systemic chemotherapy, and 14.9% cytoreduction with HIPEC alone. For metachronous colorectal carcinomatosis with a single liver metastases, 49.7% of respondents favoured systemic therapy alone, 24.6% cytoreduction with HIPEC plus systemic chemotherapy, and 4.6% cytoreduction with HIPEC alone. Responses for treatment of synchronous carcinomatosis and metachronous carcinomatosis varied by medical specialty ($p < 0.01$ and $p < 0.05$, respectively). **Conclusion:** With the exception of surgical oncologists and colorectal surgeons, most physicians involved in the care of patients with colorectal cancer do not think there is a role for cytoreduction in the treatment of colorectal carcinomatosis. Further studies to address the reasons for this attitude need to be undertaken to increase the proportion of patients being referred for potentially curative cytoreductive therapies.

Thyroid pathology reporting at a Canadian centre: a critical appraisal. Elaine Lam, Vy Nguyen, Chris Bajdik, Scott Strugnell, Blair Walker, Sam Wiseman. From the University of British Columbia, Vancouver, BC

Introduction: Cancer surgical pathology reports contain information that is crucial for diagnosis, staging, postoperative management and determining completeness of resection. The traditional narrative format is prone to errors and omissions, with variability in format and content. The College of American Pathologists (CAP) has defined, validated checklists that form the basis for synoptic reporting to ensure consistency and accuracy. **Methods:** Thyroid cancer surgical pathology reports from a Canadian tertiary care institution between 2001 and 2009 were retrospectively examined by 2 independent reviewers. Data were collected based on required and optional reporting elements from the CAP synoptic reporting checklist. Results were expressed as proportions of each element reported. **Results:** Data were abstracted from 389 pathology reports, with 90.7% agreement. Required elements with 100% reporting included procedure and histologic type. Tumour characteristics including tumour capsule were reported in 32.1% of reports, tumour laterality in 93.8% and tumour size in 81.5%; 41.1% of specimens contained multifocal tumours, with the number of foci reported in 75%. Required elements describing cancer spread included margin status, which was reported in 91.3% of reports, lymphovascular invasion in 61.7%, extrathyroidal extension in 59.9% and lymph node status in 60.2%. Of those with reported lymph nodes, extranodal cancer extension was reported in only 16.5%. There was low reporting (< 5%) of the minor elements of histologic grade perineural invasion. **Conclusion:** With narrative pathologic reporting, the majority of elements were incompletely reported. Crucial information that may impact postsurgical management may not be conveyed to the surgeon and treatment team. Such baseline data have provided justification for transitioning to a thyroid pathology synoptic reporting format.

Developing oncolytic virotherapy for malignant peritoneal mesothelioma. Sergio A. Acuna,* Besmira Cako,* Kathryn Ottolino-Perry,* Nan Tang,* Fernando A. Angarita,* J. Andrea McCart.** From the *Division of Experimental Therapeutics, Toronto General Research

Institute, and the †Division of General Surgery, Department of Surgery, Mount Sinai Hospital and University of Toronto, Toronto, Ont.

Introduction: Malignant peritoneal mesothelioma (MPM) is an aggressive cancer of the abdominal cavity with a dismal prognosis. Recent treatments have used surgery and heated intraperitoneal chemotherapy. The focus of this study was to develop a novel combination surgery and virotherapy approach to MPM. Oncolytic viruses are a promising new therapy for cancer due to their ability to kill tumour cells with minimal toxicity to normal tissues. Here we examined the potential of vaccinia virus (VV) to treat MPM. **Methods:** AC29, AB12 (murine mesothelioma) and NIH/3T3 cells (normal murine fibroblasts) were used to study the in vitro effects of VV. Cell viability was tested using MTS and crystal violet assays. Immunocompetent female CBA/J and BALB/c mice were injected intraperitoneally with murine MPM cells; mice underwent surgical debulking and/or were administered intraperitoneal VV. **Results:** The cytopathic effect of VV on MPM cell lines was significantly increased (viability: 10.5% [AC29] v. 26.1% [AB12] v. 73.3% [control]) compared with the control cell line. In an orthotopic model, VV induced tumour regression and resulted in long-term survival of 33.3% of mice. Debulking of tumour by surgery led to improved survival. Use of VV as an adjuvant treatment after surgical debulking is underway. **Conclusion:** The VV selectively kills MPM cells in vitro and in vivo. It leads to improved survival in immunocompetent murine models and might be used as an adjuvant to debulking surgery. These promising results justify further studies of VV as a novel treatment for MPM.

Cytoreductive surgery and heated intraperitoneal chemotherapy for gastric cancer with peritoneal carcinomatosis: a systematic review. Richdeep S. Gill,* David P. Al-Adra,* Jeevan Nagendran,* Sandy Campbell,† Xinzhe Shi,‡ Erika Haase,* Daniel Schiller.* From the *Department of Surgery and †Library Services, University of Alberta, and the ‡Centre for the Advancement of Minimally Invasive Surgery (CAMIS), Royal Alexandra Hospital, Edmonton, Alta.

Introduction: Gastric cancer with peritoneal carcinomatosis (PC) has an extremely poor prognosis, with median survival estimated at 4 months with best supportive care and 7–10 months with aggressive chemotherapy. Cytoreductive surgery combined with heated intraperitoneal chemotherapy (HIPEC) has been shown to improve survival in colorectal cancer with PC compared with systemic chemotherapy. The efficacy of cytoreductive surgery combined with HIPEC in gastric cancer remains unproven. Our objective was to systematically review the literature regarding the effectiveness of cytoreductive surgery combined with HIPEC in patients with gastric cancer who also have PC. **Methods:** A comprehensive search of electronic databases was completed from 2000 to 2010. Unpublished and non-English-language results were excluded. All studies involving cytoreductive surgery combined with HIPEC in adults with gastric cancer with PC were included. Two authors identified potentially relevant articles, assessed the studies for inclusion and extracted data. **Results:** An initial screen identified 144 titles, of which 36 studies met the inclusion criteria. Following full manu-

script assessment, 10 articles were included. In total, 441 patients with gastric cancer and PC were extracted with a median follow-up of 48 months. Their overall median survival was 7.9 (range 6.1–9.2) months and improved to 15 (range 9.5–43.4) months for patients with completeness of cytoreduction scores of 0/1. The median 30-day mortality rate was 4.8% (range 0%–14.3%), with a combined morbidity of 21.5%. **Conclusion:** This systematic review demonstrates that combined cytoreductive surgery and HIPEC may improve survival in selected patients with gastric cancer with PC when a complete cytoreduction is achieved, albeit with significant risk of mortality and morbidity.

Metabolomic profiling distinguishes patients with pancreatic masses that are adenocarcinomas versus non-functioning neuroendocrine tumours. Yarrow J. McConnell, Aalim M. Weljie, Karen A. Kopciuk, Janice L. Pasioka, Elijah Dixon, Francis Sutherland, Nicole Dunse, Oliver F. Bathe. From the University of Calgary, Calgary, Alta.

Introduction: In the diagnostic work-up of pancreatic mass lesions, it is difficult to accurately distinguish pancreatic adenocarcinoma (PA) from nonfunctioning neuroendocrine tumours (NETs). Accurate preoperative identification of patients with NETs would facilitate operative planning. This pilot study aims to investigate the ability of serum metabolomics to distinguish PA from nonfunctioning NETs in pancreatic masses. **Methods:** Fasting serum samples were collected as part of an institutional biorepository program (IRB#E20846) from patients undergoing resection of a pancreatic mass. Accompanying clinical data, including preoperative testing for functional NET and final pathology, were collected prospectively. Gas chromatography–mass spectrometry (GC-MS) spectra were acquired for aqueous metabolites and analyzed with multivariate methods (orthogonal partial least squares discriminant analysis [OPLS-DA]) using SIMCA-P+ (V12.0.1) software. Metabolite identification was conducted using Metabolite Detector (V2.06β). **Results:** Of patients with resected pancreatic masses, 35 had PA and 14 had NETs without preoperative elevation of functional tumour markers including gastrin and insulin. The median patient age was 64 years, 51% were male and 46% had a mass in the body/tail of the pancreas compared with 54% in the head/uncinate. Patients with PA had a significantly different serum metabolomic profile from those with nonfunctioning NETs on OPLS-DA modelling (36 metabolite components, $R^2 = 0.63$, $Q^2 = 0.45$, $p = 0.002$). The constructed model correctly classified 91% of cases. **Conclusion:** In this pilot study, serum metabolomics was able to distinguish pancreatic adenocarcinoma from nonfunctional neuroendocrine tumours. Further analysis may yield a novel serum test to distinguish these lesions in clinical practice.

Outcomes for deep melanoma (> 4 mm): an analysis of 1731 cases. Moises Cukier,*† Natalie G. Coburn,† Calvin H.L. Law,† Frances C. Wright.† From the Divisions of Surgical Oncology, *University of Toronto and †Odette Cancer Centre, Sunnybrook Health Sciences Centre, Toronto, Ont.

Introduction: Outcomes and optimal surgical treatment for patients with deep melanoma (> 4 mm) have not been well studied. The purpose of our study is to describe the clinicopathological

features of this population and analyze predictive factors for survival. **Methods:** We performed an analysis of the Surveillance, Epidemiology, and End Results (SEER) database, selecting patients aged 18–80, diagnosed in 2004–2007, who had truncal or limb melanoma with a Breslow depth of more than 4.0 mm. Overall survival was calculated using the Kaplan–Meier method and was adjusted for prognostic factors using a Cox proportional hazards regression model. **Results:** We identified 1731 patients with deep melanoma: 63% were male, and the median age was 61 years. At presentation, 90% had no evidence of metastatic disease, and of these patients, only 11% had clinically positive lymph nodes (LN) and 22% had micrometastases. The 3-year

overall survival was 60.2%. Multivariate Cox analysis demonstrated that improved survival was associated with age younger than 60 years (HR 0.599, $p < 0.001$), no ulceration (HR 0.656, $p = 0.0003$), clinically negative LN (HR 0.339, $p < 0.0001$), M0 disease (HR 0.335, $p < 0.0001$) and Breslow 4–8 mm (HR 0.667, $p = 0.0002$). **Conclusion:** Ulceration, nodal status, metastases and melanoma depth negatively predict survival; however, thickness was the least influential. Overall, we found that patients with deep melanomas have encouraging outcomes. We advocate that in the absence of metastatic disease, these patients should be offered the same surgical treatment as those with melanomas of intermediate thickness.