Review Article

Rare histologies in peritoneal carcinomatosis: a narrative review

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Background and Objective: Peritoneal carcinomatosis (PC) occurs in advanced cancer and may indicate a poor prognosis with limited options. Cytoreductive surgery (CRS) in combination with various intraperitoneal (IP) chemotherapy have provided treatment for select cancers at this stage. However, other cancers are treated palliatively. We summarized current knowledge of incidence, prevalence, and management of PC from rarely treated etiologies.

Methods: We performed a literature search to identify publications using PubMed from 2016 to October 13, 2021 in all languages. 37 case reports, 39 observational or retrospective reviews, and nine clinical trials were identified with treated PC from the following malignancies: pancreas, breast, small intestine, urologic, sarcoma, hepatobiliary, adrenal, and neuroendocrine.

Key Content and Findings: CRS may benefit gastrointestinal stromal tumor (GIST), desmoplastic small round cell tumor (DSRCT), fibrolamellar hepatocellular carcinoma (FHCC), and neuroendocrine tumor (NET). CRS and hyperthermic intraperitoneal chemotherapy (HIPEC) may benefit breast, small bowel adenocarcinoma (SBA), urachal carcinoma (UC), sarcoma, hepatocellular carcinoma (HCC), cholangiocarcinoma (CCA), and adrenocortical carcinoma (ACC). Management is uncertain for prostate, urothelial cell carcinoma (UCC), kidney, and gallbladder carcinoma (GC). Pancreatic ductal adenocarcinoma (PDAC) may benefit from staged IP chemotherapy and/or pressurized intraperitoneal aerosolized chemotherapy (PIPAC).

Conclusions: Rarely treated PC from specific cancers require reconsideration. Multidisciplinary treatment based on tumor histology may include CRS and various forms of IP therapy.

Keywords: Carcinomatosis; pancreas; breast; hepatobiliary; sarcoma

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Introduction

Background

Peritoneal carcinomatosis (PC) usually occurs in advanced abdominal cancer. Historically, management of PC emphasized palliative care (1,2). In the 1990s, this was challenged for select cancers by surgical resection termed cytoreductive surgery (CRS) and intraperitoneal (IP) chemotherapy including hyperthermic intraperitoneal chemotherapy (HIPEC) (1-6). CRS is used to remove visible disease while HIPEC is used to remove microscopic disease during the same surgical procedure. HIPEC is the use of heated IP chemotherapy intra-operatively via the use the surgically placed catheters.

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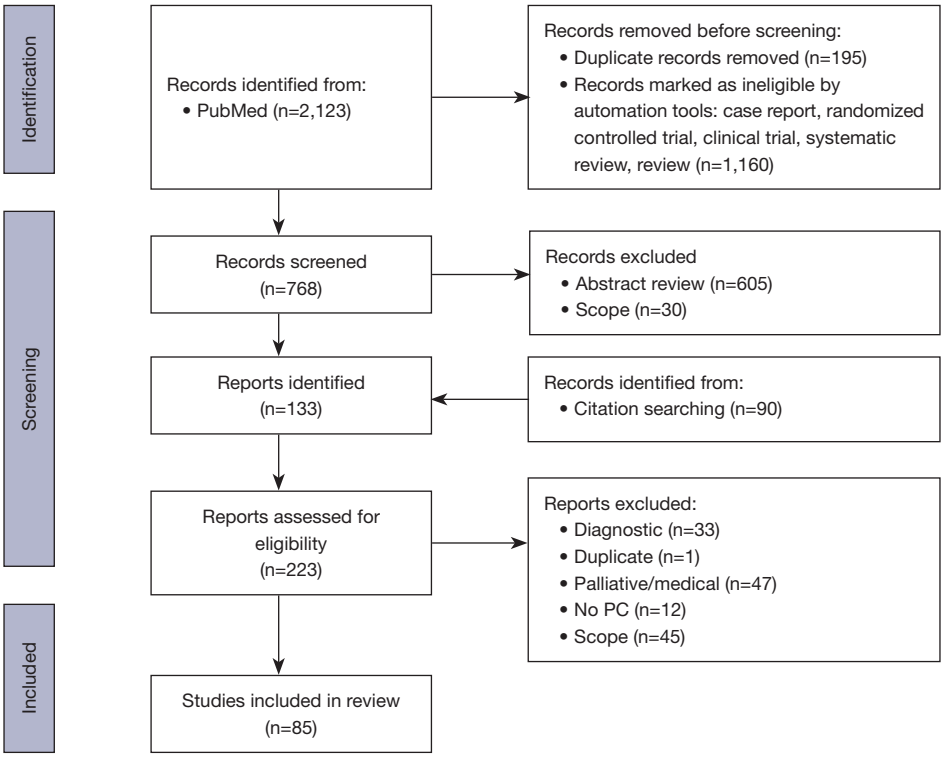

Figure 1 Flow diagram of search strategy adapted from PRISMA (19). PC, peritoneal carcinomatosis.

CRS and HIPEC are common for PC of colorectal, gastric, appendiceal, ovarian, pseudomyxoma peritonei, and mesothelioma origins (1,3,7,8). However, the role of CRS and HIPEC is undefined for other cancers which are considered rare and/or rarely treated histologies based on prior literature and delineated in the Appendix 1 (3,7-9). In addition, other techniques may improve survival in patients with PC including: novel IP chemotherapy (immunotherapy, hydrogel, electrostatic, oncolytic virus, and others), pressurized intraperitoneal aerosolized chemotherapy (PIPAC), photothermal therapy, and electrochemotherapy (2,10-18). PIPAC is the use of aerosolized chemotherapy infused intraabdominally with a surgically placed catheter. This review aims to identify cancers uncommonly treated for PC that may benefit from additional surgical or regional interventions.

Objectives

This review will summarize current incidence, prevalence, and management of untreated PC from 2016 to date. We present the following article in accordance with Narrative Review reporting checklist (available at https://dmr.amegroups.com/article/view/10.21037/dmr-22-4/rc).

Methods

A literature search was conducted for published case reports, clinical trials, or observational/retrospective reviews using PubMed for articles in all languages from 2016 to October 13, 2021. *Figure 1* and *Table 1* summarize the narrative review (19). A full search strategy is in *Table 2* and the Appendix 1.

Discussion

Narrative

One case report, four reviews and 3 trials were specific to pancreas (20-27). Three case reports, two reviews, and one clinical trial were specific to small intestine (28-33). Six case reports covered urologic malignancy (34-39). Ten case reports, five reviews, and two clinical trials covered sarcomas (40-47,59,69-71,73-77). Six case reports and 13 reviews were specific to desmoplastic small round cell tumor (DSRCT) (48-54,56-58,60-68). Eight case reports

Table 1 Results of literature review

Author	Year	Type	Primary site	Malignancy	Sample size	CRS or surgery	IP C	Other treatment	OS (M)	RFS (M)	PFS (M)
Yamada (20)	2020	Phase I/II clinical trial	Pancreas	PDAC	38	No[1]	Yes	Ge/Nab-Px/IP Px	12.4[3]	–	–
					8	Yes[1]	Yes	Ge/Nab-Px/IP Px	16.5[3]	–	–
Satoi (21)	2017	Phase II clinical trial	Pancreas	PDAC	25	No[1]	Yes	Px/TS-1/IP Px	14.2[3]	–	–
					8	Yes[1]	Yes	Px/TS-1/IP Px	27.8[3]	–	–
Takahara (22)	2016	Phase II clinical trial	Pancreas	PDAC	35	No[1]	Yes	Px/TS-1/IP Px	4.8[3]	–	2.8[3]
Schwarz (23)	2018	Retrospective	Pancreas	PDAC	21	Yes[1]	Yes	HIPEC	4–24[3,8]	13.2	–
Tentes (24)	2018	Retrospective	Pancreas	PDAC	6	Yes[1]	Yes	HIPEC	8[3]	–	–
Graversen (25)	2017	Observational	Pancreas	PDAC	5	–	Yes	Ge/TS-1/PIPAC	14[3]	–	–
Khosrawipour (26)	2017	Observational	Pancreas	PDAC	20	–	Yes	PIPAC	9.15[4]	–	–
Rotolo (27)	2020	Case report	Pancreas	PDAC	1	No[1]	No	FOLFIRINOX	33	–	11
						No[1]	Yes	FOLFIRI/PIPAC		–	22
Dumont (28)	2020	Phase I clinical trial	Mixed	Gastric	3	–	Yes	PIPAC	–	–	–
				Small bowel	2	–	Yes	PIPAC	–	–	–
				Colorectal	5	–	Yes	PIPAC	–	–	–
Liu (29)	2018	Observational	Small bowel	Adenocarcinoma	152	Yes[1]	Yes	HIPEC	32[5]	–	–
Liu (30)	2016	Observational	Small bowel	Mixed	21	Yes[1]	Yes	HIPEC/C	48[5]	–	–
					10	Yes[1]	No	C	15[5]	–	–
Seomangal (31)	2019	Case report	Jejunum	Adenocarcinoma	1	No[1]	No	FOLFOX + bevacizumab	[2]	–	6
						Yes	No	–		–	–
Sawatsubashi (32)	2018	Case report	Duodenum	Adenocarcinoma	1	Yes	No	Cisplatin + TS-1	33	24	–
						Yes[1]	No	CAPOX + bevacizumab		–	6
						Yes[1]	No	R		–	–
Takemoto (33)	2016	Case report	Jejunum	Adenocarcinoma	1	Yes[1]	No	TS-1	[2]	22	–
						Yes	No	Paclitaxel + doxifluridine		55	–
Achard (34)	2020	Case report	Prostate	Adenocarcinoma	1	Yes	No	–	[2]	120	–
						No	No	Degarelix/R		24	–
						Yes[1]	No	Degarelix		–	–
					1	Yes	No	–	[2]	10	–
						No	No	ADT/R		131	–
						Yes[1]	No	ADT/docetaxel		–	–
Motterle (35)	2020	Case report	Prostate	Adenocarcinoma	1	Yes	No	–	[2]	20	–
						Yes[1]	No	–		24	–
						No[1]	No	ADT		18	–
					1	Yes	No	–	[2]	48	–
						Yes[1]	No	Docetaxel/ADT		60	–
					1	Yes	No	–	[2]	34	–
						Yes[1]	No	Docetaxel/ADT		–	34

Table 1 (*continued*)

Table 1 (*continued*)

Author	Year	Type	Primary site	Malignancy	Sample size	CRS or surgery	IP C	Other treatment	OS (M)	RFS (M)	PFS (M)
Caño-Velasco (36)	2019	Case report	Prostate	Adenocarcinoma	1	Yes	No	–	[2]	6	–
						No	No	R/H		24	–
						Yes	No	–		18	–
						Yes[1]	No	H/C		–	–
Le Thiec (37)	2019	Case report	Prostate	Adenocarcinoma	1	Yes	No	–	[2]	24	–
						No	No	R		36	–
						Yes	No	–		30[†]	–
						Yes[1]	No	US		6	–
Li (38)	2020	Case report	Bladder	Urothelial carcinoma	1	Yes	No	–	41	<1	–
						Yes	No	–		10	–
						No[1]	No	Carboplatin/ gemcitabine		–	12
						Yes	No	Nivolumab		–	6
						No	No	Carboplatin/ gemcitabine		–	6
						No	No	–	41	–	6[†]
Pandey (39)	2018	Case report	Kidney	RCC	1	Yes	No	–	16	6	–
						Yes[1]	No	Sunitinib		–	8
						No[1]	No	Sorafenib		–	2
Kimura (40)	2020	Case report	Ileum	GIST	1	Yes[1]	No	Imatinib	[2]	144	–
						Yes	No	Sunitinib		24	–
Ono (41)	2019	Case report	Small bowel	GIST	1	Yes[1]	No	Imatinib	[2]	–	19
						Yes[1]	No	Imatinib		–	15
Terada (42)	2017	Case report	Small bowel	GIST	1	Yes	No	Imatinib	[2]	24	–
						Yes[1]	No	Imatinib		–	–
						Yes[1]	No	Imatinib		–	–
						Yes[1]	No	Imatinib		–	–
						Yes[1]	No	Imatinib		–	–
						Yes[1]	No	Imatinib		–	36
Ishigame (43)	2018	Case report	Duodenum	GIST	1	Yes	No	Imatinib	99	8	–
						Yes	No	Imatinib		40	–
						Yes[1]	No	Imatinib		10	–
						Yes[1]	No	Imatinib		7	–
						Yes	No	Sunitinib[7]		8	–
						No	No	Imatinib + TACE		4	–
						No	No	Imatinib + TACE		2	–
						No	No	Imatinib + RFA		5	–
						Yes[6]	No	Sunitinib		–	–

Table 1 (*continued*)

Table 1 (*continued*)

Author	Year	Type	Primary site	Malignancy	Sample size	CRS or surgery	IP C	Other treatment	OS (M)	RFS (M)	PFS (M)
Sugase (44)	2016	Case report	Jejunum	GIST	1	Yes	No	–	[2]	24	–
						No[1]	No	Nilotinib		–	57
						Yes	No	Nilotinib		21	–
			Jejunum	GIST	1	Yes	No	Imatinib	[2]	48	–
						No	No	Nilotinib		–	41
						Yes	No	–		16	–
						No[1]	No	Imatinib		–	–
Monobe (45)	2017	Case report	Jejunum	GIST	1	No	No	Imatinib	[2]	–	36
						Yes[1]	No	–		–	17
						No[1]	No	Imatinib		24	–
Modak (46)	2020	Phase I clinical trial	Various	DSRCT	48	Yes[1]	No	C/IP ^{131}I-omburtamab[9]	–	–	–
				RMS	3	Yes[1]	No	C/IP ^{131}I-omburtamab[9]	–	–	–
				ES	1	Yes[1]	No	C/IP ^{131}I-omburtamab[9]	–	–	–
Hayes-Jordan (47)	2018	Phase II clinical trial	Various	DSRCT	14	Yes[1]	Yes	C/R/HIPEC	44.3[§]	14.9[§]	–
				RMS	2	Yes[1]	Yes	C/HIPEC	12.5[§]	4.5[§]	–
				UDS	2	Yes[1]	Yes	C/R/HIPEC	12.5[§]	4.5[§]	–
				ES	1	Yes[1]	Yes	C/R/HIPEC	12.5[§]	4.5[§]	–
Wang (48)	2021	Retrospective	Peritoneum	DSRCT	6	Yes[1]	Yes	HIPEC	–	14.4[3]	–
					2	Yes[1]	No	–	–	–	7.5–22.6
Stiles (49)	2020	Retrospective	Peritoneum	DSRCT	10	Yes[1]	Yes	HIPEC	45[3]	–	–
Gani (50)	2019	Retrospective	Peritoneum	DSRCT	200	Yes[1]	–	–	25.9[3]	–	–
					285	No[1]	–	–	25.9[3]	–	–
Honoré (51)	2019	Retrospective	Peritoneum	DSRCT	17	Yes[1]	Yes	HIPEC or EPIC	25[3]	–	–
					54	Yes[1]	No	–	25[3]	–	–
					29	No[1]	No	–	25[3]	–	–
Scheer (52)	2019	Observational	Various	DSRCT	5	Yes[1]	Yes	HIPEC	–	–	–
					35	Yes[1]	No	–	–	–	–
					20[f]	No[1]	No	–	19.2[3]	–	–
Stiles (53)	2018	Retrospective	Various	DSRCT	74	Yes[1]	No	–	31.3[3]	–	–
					48	No[1]	No	–	18.3[3]	–	–
Subbiah (54)	2018	Retrospective	Peritoneum	DSRCT	82	Yes[1]	Yes	HIPEC	35[3]	–	–
					32	Yes[1]	No	–	35[3]	–	–
					73	No[1]	No	–	35[3]	–	–
Zmora (55)	2018	Retrospective	Various	DSRCT	1	Yes[1]	Yes	V/I/D/E/HIPEC	21	–	–
				RMS	2	Yes[1]	Yes	C/R/HIPEC	–	28–29	–
				RMS	1	Yes[1]	Yes	C/R/HIPEC	7	–	–
				NB	1	Yes[1]	Yes	C/R/HIPEC	–	3	–
Angarita (56)	2017	Retrospective	Peritoneum	DSRCT	5	Yes[1]	No	–	51[3]	–	–
					15	No[1]	No	–	21[3]	–	–

Table 1 (*continued*)

Table 1 (*continued*)

Author	Year	Type	Primary site	Malignancy	Sample size	CRS or surgery	IP C	Other treatment	OS (M)	RFS (M)	PFS (M)
Honoré (57)	2017	Retrospective	Peritoneum	DSRCT	37	Yes[1]	No	–	42[3]	–	–
					11	Yes[1]	Yes	HIPEC or EPIC	42[3]	–	–
Frank (58)	2017	Retrospective	Various	DSRCT	1	Yes[1]	No	V/IF/D/E	20.4	–	–
Scalabre (59)	2018	Retrospective	Various	DSRCT	7	Yes[1]	Yes	C/HIPEC	16.46[‡]	–	–
				ES	1	Yes[1]	Yes	C/R/HIPEC	[2]	–	12.6
				RMS	1	Yes[1]	Yes	C/R/HIPEC	17.5	–	–
Atallah (60)	2016	Retrospective	Peritoneum	DSRCT	27	Yes[1]	No	R/C	40.3[3]	–	–
					22	Yes[1]	No	C	28.3[3]	–	–
Osborne (61)	2016	Retrospective	Peritoneum	DSRCT	32	Yes[1]	Yes	HIPEC/C/R	60[3]	–	–
Somashekhar (62)	2016	Retrospective	Various	DSRCT	1	Yes[1]	Yes	HIPEC	–	–	–
Sjoberg Bexelius (63)	2021	Case report	Peritoneum	DSRCT	1	No[1]	No	V/D/Cy & IF/E	[2]	–	8
						Yes[1]	Yes	R/Vi/Cy/HIPEC		–	18
Gill (64)	2021	Case report	Peritoneum	DSRCT	1	No[1]	No	V/D/Cy/IF/E	[2]	–	2
						Yes[1]	Yes	V/Da/I & V/IF/Te/ HIPEC		11	–
						No	No	^{90}Yittrium Radioembolization		18	–
Xiao (65)	2021	Case report	Peritoneum	DSRCT	1	No[1]	No	V/D/Cy & IF/E	[2]	–	3.5
						Yes[1]	Yes	HIPEC		0.5	–
						Yes	No	D/Cy & B/M/T/R/aH		72	–
Tsoukalas (66)	2020	Case report	Peritoneum	DSRCT	1	Yes[1]	Yes	HIPEC/R seed	6	1[¶]	–
						No[1]	No	Cy/A/V/I/E		–	5
Nacef (67)	2019	Case report	Peritoneum	DSRCT	1	Yes[1]	No	–	[2]	1.25	–
						No[1]	No	Cy/D/V		–	1
						No[1]	No	IF/E		–	–
Cracco (68)	2017	Case report	Peritoneum	DSRCT	1	Yes[1]	Yes	^{90}Yittrium Radioembolization/ C/HIPEC	[2]	–	3
						Yes	No	Do/IF		24	–
Gesche (69)	2019	Observational	Various	RMS	6	Yes[1]	Yes	–	[2]	7–41	–
Karamveri (70)	2019	Retrospective	Various	Liposarcoma	7	Yes[1]	Yes	HIPEC	55[3]	9[5]	–
				Leiomyosarcoma	4	Yes[1]	Yes	HIPEC	55[3]	9[5]	–
				RMS	5	Yes[1]	Yes	HIPEC	55[3]	9[5]	–
				Ovarian sarcoma	4	Yes[1]	Yes	HIPEC	55[3]	9[5]	–
Naffouje (71)	2018	Retrospective	Various	Liposarcoma	15	Yes[1]	Yes	HIPEC	–	–	–
				Leiomyosarcoma	4	Yes[1]	Yes	HIPEC	–	–	–
				DSRCT	2	Yes[1]	Yes	HIPEC	–	–	–
				Angiosarcoma	1	Yes[1]	Yes	HIPEC	–	–	–
				PEComa	1	Yes[1]	Yes	HIPEC	–	–	–
				Histiocytoma	1	Yes[1]	Yes	HIPEC	–	–	–
				Carcinosarcoma	1	Yes[1]	Yes	HIPEC	–	–	–

Table 1 (*continued*)

Table 1 (*continued*)

Author	Year	Type	Primary site	Malignancy	Sample size	CRS or surgery	IP C	Other treatment	OS (M)	RFS (M)	PFS (M)
Abu-Zaid (72)	2016	Retrospective	Various	Liposarcoma	7	Yes[1]	Yes	HIPEC	28.3[3]	18[5]	–
				Leiomyosarcoma	1	Yes[1]	Yes	HIPEC	28.3[3]	18[5]	–
				ES	1	Yes[1]	Yes	HIPEC	28.3[3]	18[5]	–
				GIST	2	Yes[1]	Yes	HIPEC	28.3[3]	18[5]	–
Spiliotis (73)	2016	Retrospective	Various	Liposarcoma	4	Yes[1]	Yes	HIPEC	12[3]	10[5]	–
				Leiomyosarcoma	2	Yes[1]	Yes	HIPEC	28–33	0–16	–
				Fibrosarcoma	1	Yes[1]	Yes	HIPEC	4	0	–
				RMS	1	Yes[1]	Yes	HIPEC	12	0	–
Kawamura (74)	2019	Case report	Abdominal	RMS	1	Yes[1]	No	C/R	[2]	36	–
Pleština (75)	2019	Case report	Lung	UPS	1	Yes	No	–	5	3	–
						Yes[1]	No	–		–	2
Jun-long (76)	2017	Case report	Epididymus	Liposarcoma	1	Yes	No	–	180	120	–
						Yes	No	–		48	–
						Yes[1]	No	–		–	12
Lin (77)	2016	Case report	Pancreas	Stromal tumor & leiomyosarcoma	1	Yes	No	^{125}I/microwave coagulation/imatinib	[2]	13	–
						Yes[1]	No	Microwave coagulation		–	–
Mehta (78)	2018	Observational	Liver	HCC	21	Yes[1]	Yes	HIPEC	46.7[3]	–	–
Berger (79)	2016	Retrospective	Liver	HCC	17	Yes[1]	No	–	19.5[3]	–	–
					5	Yes[1]	Yes	HIPEC	29.7[3]	–	–
Ji (80)	2019	Case report	Liver	HCC	1	Yes[1]	No	Sorafenib	[2]	–	3
						Yes[1]	Yes	HIPEC/IP C/IV C		22	–
Takase (81)	2019	Case report	Liver	HCC	1	Yes	No	–	[2]	33	–
						Yes	No	–		25	–
						Yes[1]	No	–		–	2
						No[1]	No	Sorafenib		–	3
						Yes[1]	No	Sorafenib		–	11
						Yes[1]	No	–		–	5
						Yes[1]	No	Sorafenib		–	4
Takiuchi (82)	2018	Case report	Liver	HCC	1	Yes	No	No	30	7	–
						No	No	TACE/RFA		8	–
						Yes[1]	No	Sorafenib		–	2.5
						Yes[1]	No	TACE/TS-1/IAC/R/CK		–	12.5
Spiliotis (83)	2017	Case report	Liver	HCC	3	Yes	No	–	[2]	8–24	–
						Yes[1]	Yes	HIPEC		–	2–28
					1	Yes	No	–	14	6	–
						Yes[1]	Yes	HIPEC		–	8
Kyziridis (84)	2020	Case report	Liver	FHCC	1	Yes	No	–	[2]	12	–
						Yes	No	–		4	–
						Yes[1]	No	–		84	–
						Yes[1]	No	–		12	–
						Yes[1]	Yes	HIPEC		12	–

Table 1 (*continued*)

Table 1 (*continued*)

Author	Year	Type	Primary site	Malignancy	Sample size	CRS or surgery	IP C	Other treatment	OS (M)	RFS (M)	PFS (M)
Amblard (85)	2018	Retrospective	Various	CCA	34	Yes[1]	Yes	HIPEC/C	21.4[3]	–	8.8[3]
					21	No[1]	No	C	9.3[3]	–	9.3[3]
Falkenstein (86)	2018	Phase I clinical trial	Abdominal	GC	5	–	Yes	PIPAC	2.36[4]	–	–
				CCA	8	–	Yes	PIPAC	4[4]	–	–
Stefano (87)	2021	Case report	IH	CCA	1	Yes	No	Ge/Ci	[2]	11	–
						Yes	No	Ce/FOLFIRI		8	–
						No	No	Derazantinib		–	14
						No[1]	No	No		–	3
						Yes[1]	Yes	REP/BI/HIPEC		–	3
						No	No	FOLFOX		–	5
						No	No	RE		–	2
						No	No	TACE		–	12
Hernandez (88)	2020	Case report	IH	CCA	1	Yes[1]	No	Ge/Ci	[2]	–	1[a]
						Yes[1]	Yes	HIPEC		12	–
Mikuriya (89)	2020	Case report	Gallbladder	Adenocarcinoma	1	Yes[1]	No	Ge/Ci	[2]	–	12
						Yes	No	TS-1 then UFT		–	15
						No	No	No		–	5
Hughes (90)	2018	Phase II clinical trial	Adrenal	ACC	10	Yes[1]	Yes	HIPEC	[2]	–	19[3]
Sugarbaker (91)	2016	Case report	Adrenal	ACC	1	Yes	No	R/C	[2]	–	13
						No[1]	No	–		–	2
						Yes[1]	Yes	HIPEC		–	5
						Yes[1]	Yes	HIPEC		4	–
						Yes	Yes	HIPEC		–	–
Di Giorgio (92)	2020	Retrospective	Mixed	PDAC	14	No[1]	Yes	PIPAC/C/other	16.2[3]	–	–
				CCA	6	No[1]	Yes	PIPAC/C/other	12.3[3]	–	–
Leigh (93)	2020	Retrospective	Mixed	HCC	9	Yes[1]	Yes	HIPEC	42[3]	–	7[3]
				CCA	4	Yes[1]	Yes	HIPEC	19[3]	–	10[3]
				GC	3	Yes[1]	Yes	HIPEC	8[3]	–	2[3]
				PDAC	1	Yes[1]	Yes	HIPEC	15[3]	–	15[3]
Graversen (94)	2018	Phase I clinical trial	Mixed	Small bowel	2	–	Yes	PIPAC	–	–	–
				CCA	2	–	Yes	PIPAC	–	–	–
				Pancreas	3	–	Yes	PIPAC	–	–	–
				Unknown	1	–	Yes	PIPAC	–	–	–
Honoré (95)	2016	Retrospective	Mixed	DSRCT	4	Yes[1]	Yes	HIPEC or EPIC	–	–	–
				ACC	4	Yes[1]	Yes	HIPEC or EPIC	–	–	–
				UC	3	Yes[1]	Yes	HIPEC or EPIC	–	–	–
				FHCC	3	Yes[1]	Yes	HIPEC or EPIC	–	–	–
				SPN	2	Yes[1]	Yes	HIPEC or EPIC	–	–	–
				NB	1	Yes[1]	Yes	HIPEC or EPIC	–	–	–
				RMS	1	Yes[1]	Yes	HIPEC or EPIC	–	–	–

Table 1 (*continued*)

Table 1 (*continued*)

Author	Year	Type	Primary site	Malignancy	Sample size	CRS or surgery	IP C	Other treatment	OS (M)	RFS (M)	PFS (M)
Goéré (9)	2017	Retrospective	Mixed	Breast	17	Yes[1]	Yes	HIPEC	–	–	–
				CCA	39	Yes[1]	Yes	HIPEC	–	–	–
				DSRCT	34	Yes[1]	Yes	HIPEC	–	–	–
				GIST	47	Yes[1]	Yes	HIPEC	–	–	–
				HCC	19	Yes[1]	Yes	HIPEC	–	–	–
				NET	114	Yes[1]	Yes	HIPEC	–	–	–
				Pancreas	30	Yes[1]	Yes	HIPEC	–	–	–
				Sarcoma	166	Yes[1]	Yes	HIPEC	–	–	–
				UC	35	Yes[1]	Yes	HIPEC	–	–	–
Horvath (96)	2018	Retrospective	Mixed	PDAC	6	–	Yes	PIPAC	12.7[4]	–	–
				CCA	6	–	Yes	PIPAC	15.1[4]	–	–
Kurtz (97)	2018	Retrospective	Mixed	Hepatobiliary	9	–	Yes	PIPAC	–	–	–
				Prostate	1	–	Yes	PIPAC	–	–	–
Brandl (98)	2017	Retrospective	Mixed	Small bowel	3	Yes[1]	Yes	HIPEC	–	–	–
				Sarcoma	3	Yes[1]	Yes	HIPEC	–	–	–
				CCA	1	Yes[1]	Yes	HIPEC	–	–	–
				NET	1	Yes[1]	Yes	HIPEC	–	–	–
				Unknown	1	Yes[1]	Yes	HIPEC	–	–	–
				MPNST	1	Yes[1]	Yes	HIPEC	–	–	–
Teixeira Farinha (99)	2017	Retrospective	Mixed	Small bowel	1	–	Yes	PIPAC	–	–	–
Graziosi (100)	2016	Retrospective	Mixed	Small bowel	2	Yes[1]	Yes	HIPEC	–	–	–
				Breast	1	No[1]	Yes	HIPEC	–	–	–
Hamilton (101)	2016	Retrospective	Mixed	Small bowel	1	Yes[1]	Yes	HIPEC	–	–	–
Pastrián (102)	2019	Case report	Liver	NET	1	Yes[1]	No	Ci/E	30	–	–
						Yes[1]	No	Ce/Te		–	–
						Yes[1]	No	Everolimus		–	–
						Yes[1]	No	Sunitinib		–	–
Nagaro (103)	2019	Case report	Pancreas	NET	1	Yes	No	–	[2]	120	–
						Yes	No	–		96	–
						No	No	RFA		–	6
						Yes	No	–		24	–
						Yes[1]	No	–		24	–

[1]peritoneal metastases; [2]alive at time of publication; [3]mOS; [4]median survival after 1st PIPAC; [5]median survival from surgery; [6]aborted surgery; [7]discontinued due to side-effects; [8]complete cytoreduction *vs.* incomplete cytoreduction; [9]IP ^{131}I-omburtamab; [†]not specific number of months in case report; [‡]mOS; [§]median survival from the time of treatment; [¶]subsequent imaging. CRS, cytoreductive surgery; OS, overall survival from diagnosis; RFS, recurrence-free survival from treatment; PFS, progression-free survival from treatment; M, months; PDAC, pancreatic ductal adenocarcinoma; NET, neuroendocrine tumor; SPN, solid pseudopapillary neoplasm; RCC, renal cell carcinoma; GIST, gastrointestinal stromal tumor; PEComa, perivascular epithelial cell tumor; FHCC, fibrolamellar hepatocellular carcinoma; CCA, cholangiocarcinoma; GC, gallbladder carcinoma; HCC, hepatocellular carcinoma; MPNST, malignant peripheral nerve sheath tumor; ACC, adrenal cortical carcinoma; DSRCT, desmoplastic small round cell tumor; RMS, rhabdomyosarcoma; UDS, undifferentiated sarcoma; ES, Ewing's sarcoma; UPS, undifferentiated pleomorphic sarcoma; NB, nephroblastoma; UC, urachal carcinoma; C, chemotherapy; Ci, cisplatin; R, radiation; Ge, gemcitabine; Nab-Px, nab-paclitaxel; FOLFIRINOX, Fluorouracil, leucovorin, irinotecan, and oxaliplatin; FOLFOX, folinic acid, 5-fluorouracil, oxaliplatin; Ce, capecitabine; D, doxorubicin; FOLFIRI, folinic acid, 5-fluorouracil, irinotecan; S-1, tegafur, gimeracil, oteracil; CAPOX, Capecitabine and Oxaliplatin; V, vincristine; Vi, vinorelbine; Da, dactinomycin; Cy, cyclophosphamide; I, ifosfamide; B, busulfan; M, melphalan; T, thiotepa; A, adriamycin; E, etoposide; Te, temozolomide; PIPAC, pressurized intraperitoneal aerosolized chemotherapy; HIPEC, hyperthermic intraperitoneal chemotherapy; EPIC, early postoperative intraperitoneal chemotherapy; TACE, transarterial chemoembolization; Px, paclitaxel; IH, intrahepatic; IP, intraperitoneal; RFA, radiofrequency ablation; REP, reversible electroporation; US, ultrasound ablation; ADT, androgen deprivation therapy; H, hormone therapy; aH, autologous hematopoietic cell transplant; UFT, tegafur/uracil; IAC, intraarterial chemotherapy with epirubicin, cisplatin, & capecitabine or 5-fluorouracil or other chemotherapy; CK, cyberknife; Bl, bleomycin; mOS, median overall survival.

Table 2 The search strategy summary

Items	Specification
Date of search	13-Oct-21
Databases & other sources	PubMed was used as primary database. A review of references was used to find additional relevant publications
Search terms	Please see Appendix 1 (Section "Iterative searches")
Timeframe	All articles from January 1, 2016 to October 13, 2021
Inclusion & exclusion criteria	Including all published case reports, clinical trials, or observational/retrospective reviews
	Excluding only systemic therapy, diagnostic, duplicate data, non-PC, or otherwise outside of scope. See specific histology in Appendix 1 (Section "Search criteria")
Selection process	Primary author conducted initial search and selection of articles based on specific criteria. Expert review of included studies was conducted by senior author for discrepancy

PC, peritoneal carcinomatosis.

and three reviews covered hepatobiliary (78-85,87-89). One case report and one clinical trial were specific to adrenocortical carcinoma (ACC) (90,91). Two case reports were specific to neuroendocrine tumor (NET) (102,103). Twelve reviews and two clinical trials covered various cancer types (9,55,72,86,92-101). Overall, 37 case reports, 39 observational or retrospective reviews, and nine clinical trials were found as summarized in *Figure 1* and *Table 1*.

Pancreas

Pancreatic ductal adenocarcinoma (PDAC)

In the United States (US) pancreatic cancer is common with 5-year survival of 9% (104). Globally, pancreatic cancer will be the second cause of cancer death by 2030 (105). PDAC accounts for 85% of all pancreatic cancers (106). Ninety percent appear sporadically, while others may be inherited (107,108). Inherited risk includes family history (80%) and known genetic factors (20%) (108). Fifty percent present with advanced disease with 1-year survival of 12% (106). Forty-two percent of advanced patients have PC (109).

Treatment

The National Comprehensive Cancer Network (NCCN) for advanced PDAC depends on performance status. Good performance status is treated with systemic therapy or clinical trials, while poor performance status is offered palliative care, radiation, and single agent therapy (110). The Japan Pancreas Society (JPS) similarly advises systemic therapy (111). Radiation may be used for metastatic disease (111). The role of CRS and HIPEC in PC of PDAC is unclear (3).

Literature review

Eight publications were found while five publications overlap with other cancer types as summarized in *Table 1* (9,20-27,92-94,96). Three studies evaluated the use of IP chemotherapy (20-22). Takahara *et al.* (n=35) conducted a Phase II trial in patients with gemcitabine resistance and distant metastases using intravenous (IV) chemotherapy and IP paclitaxel with median overall survival (mOS) of 4.8 months (M) (22). Satoi *et al.* used the same treatment, however, patients had no resistance and only PC with mOS of 14.2 M (21). Eight patients who received curative resection resulted in mOS of 27.8 M (21). Yamada *et al.* used an alternative IV regimen with IP chemotherapy with mOS of 12.4 M (20). Eight patients underwent curative surgery and had mOS of 16.5 M (20). Four studies evaluated CRS and HIPEC (9,23,24,93). Schwarz *et al.* (n=21) found improvement with complete *vs.* incomplete CRS (mOS, 23 *vs.* 4 M, P<0.001) (23). Tentes *et al.* (n=6) achieved mOS of 8 M (24). Goéré *et al.* (n=30) reported hazard ratio (HR) in a mixed cohort including pancreas (HR: 3.23, 1.61–6.45), indicating relative low benefit (9). Leigh *et al.* (n=1) achieved OS of 15 M (93). Six studies evaluated PIPAC (25-27,92,94,96). Graversen *et al.* (n=5) reported mOS of 14 M (25). Khosrawipour *et al.* (n=20) reported mOS of 9.15 M after 1st PIPAC (26). Di Giorgio *et al.* (n=14) reported mOS of 16.2 M and mOS from 1st PIPAC of 10.9 (92). Horvath *et al.* (n=6) reported mOS of 12.7 M after 1st PIPAC (96). Graversen *et al.* (n=3) reported feasibility (94). A case report of IV chemotherapy with PIPAC reported 33 M OS (27). Neoadjuvant/adjuvant IP chemotherapy and complete CRS seem to offer benefit

while HIPEC and PIPAC require further evaluation.

Breast

Breast cancer

Breast cancer may be the most frequent extra-abdominal tumor with PC (112). In the US, 1 in 8 women have breast cancer, representing 30% of all cancers and 15% of all cancer deaths (104). Breast cancer risk is multifactorial including: genetics, family history, hormonal therapy, and other factors (113). Estimates predict increases in advanced disease (114). One percent of all advanced patients have PC with increased incidence in lobular type (112,115).

Treatment

Molecular markers, not histological subtype is used to determine treatment e.g., ER, PR, HER2 (116). In NCCN guidelines, treatment of advanced disease may include: ovarian ablation (surgical or medical) and/or systemic therapies (117). Surgery or radiation may be considered for symptom management (117). European Society for Medical Oncology (ESMO) guidelines are similar but include additional markers including: HER2, BRCA, PIK3CA, PD-L1, and others (118). Surgery is reserved for downstaging or curative resection (118). CRS and HIPEC may provide survival benefit (3).

Literature review

Two publications overlap with other cancer types as summarized in *Table 1* (9,100). Goéré *et al.* (n=17) evaluated CRS and HIPEC in a mixed cohort reporting HR including breast cancer (2.26, 1.01–5.05) indicating a relative benefit (9). Graziosi *et al.* reported laparoscopic palliative HIPEC that did not qualify for CRS (100). HIPEC and CRS appeared to show relative benefit in a single study. Given increasing burden, modern studies including CRS, HIPEC, PIPAC, and IP chemotherapy are needed.

Small intestine

Small bowel adenocarcinoma (SBA)

Small bowel malignancy is rare accounting for 3% of gastrointestinal tract malignancies in the US (104,119). Histological types include: adenocarcinoma (34–36%), carcinoid (26–28%), lymphoma (19–22%), and others (119). SBA occurs in 0.57–0.7 per 100,000 (120,121). Thirty percent will present with advanced disease with 5-year survival rate of 10% (122,123). PC occurs in 25–50% of advanced disease (124).

Treatment

French intergroup guidelines for advanced disease have no standard recommendation, however, fluoropyrimidine combination with a platinum agent may be used (125). NCCN guidelines are similar with selective addition of antiangiogenic, PD-1 and/or CTLA-4 drugs (126). Metastasectomy may be considered for select patients (126). CRS and HIPEC for PC may be beneficial in spite of limited data and heterogeneity (3).

Literature review

Six publications were found while five overlap with other cancer types as summarized in *Table 1* (28-33,94,98-101). Five studies evaluated CRS with HIPEC in patients with small bowel malignancy (29,30,98,100,101). Liu *et al.* (n=152) achieved mOS 32 M (29). Multivariable regression showed survival benefit with: peritoneal cancer index (PCI) <15, well differentiated tumor, negative lymph nodes, and treatment within 6 M of detection (29). Liu *et al.* (n=31) evaluated CRS ± HIPEC (mOS, 48 *vs.* 15 M, P=0.019) (30). Brandl *et al.* (n=3) achieved a median tumor free interval of 9.4 M (98). Graziosi *et al.* (n=1) did not report individual outcomes (100). Hamilton *et al.* (n=1) reported a major complication, but no outcomes (101). Three studies evaluated PIPAC (28,94,99). Dumont *et al.* (n=2) conducted a Phase I study in a mixed cohort where two unidentified patients underwent complete CRS with HIPEC after PIPAC (28). Teixeira Farinha *et al.* (n=1) validated acceptable quality of life in mixed cohort (99). Graversen *et al.* (n=2) evaluated a mixed cohort with no individual results (94). Three cases were reported (31-33). Seomangal *et al.* treated PC with chemotherapy and curative resection with no recurrence (31). Takemoto *et al.* treated PC with initial resection, adjuvant chemotherapy, and repeat resection with OS 77 M (33). Sawatsubashi *et al.* treated PC complicated by bleeding with radiation, with OS 33 M (32). CRS and HIPEC may be beneficial. PIPAC requires larger trials.

Urologic

Prostate

Globally, prostate cancer is the 2nd cause of cancer death in the US and 5th globally with 5% presenting with advanced disease (104,127). Globally, black race has doubled mortality attributed to biological risk and other factors (128-130). Ninety percent presents as adenocarcinoma (131,132). Ten-year survival was 18.5% in advanced disease (133). PC may occur in 4–9% of advanced patients (134-136).

Treatment

NCCN guidelines differ for advanced disease in hormone naïve prostate cancer (HNPC) compared to castration

resistant prostate cancer (CRPC) treated primarily with variations of systemic therapies and radiation (137). Surgery is reserved for biopsy or bone metastases (137). ESMO guidelines are similar to NCCN (138). Surgery is reserved for bone lesions and palliative care (138). There is no clear role for CRS or HIPEC in PC (3).

Literature review

Four publications were found while one study overlaps with other cancer types as summarized in *Table 1* (34-37,97). Kurtz *et al.* (n=1) evaluated PIPAC in a mixed cohort, no outcomes were reported (97). Four case reports evaluated PC (34-37). Achard *et al.* (n=2) treated with CRS and systemic therapy, with no survival data (34). Motterle *et al.* (n=3) treated with CRS and systemic therapy with continued survival 34–60 M (35). Caño-Velasco *et al.* (n=1) treated with CRS and systemic therapy with no evidence of disease (36). Le Thiec *et al.* excised peritoneal nodules and ablated an anastomotic recurrence with ultrasound with biochemical response (37). HNPC and CRPC require different strategies. CRS, PIPAC, and ultrasound ablation should be evaluated in larger trials.

Bladder

In the US, bladder cancer is the 4th most common and 8th cause of cancer death in men (104). Ninety percent of bladder cancers of the urothelial cell carcinoma (UCC) or transitional cell carcinoma (TCC) type (139-141). Others (5–10%) include: squamous cell carcinoma, adenocarcinoma, and others (140,141). Adenocarcinoma of the bladder has a urachal carcinoma (UC) and non-urachal subtype (worse prognosis) (140). Five percent of patients present with advanced disease, while 35% will advance after initial cystectomy with a 5-year survival of 10% (142,143). PC may occur in up to 24% of patients with bladder cancer with higher risk in non UCC (6.4% *vs.* 32%, P<0.0002) (144).

Treatment

According to NCCN guidelines, treatment for advanced disease is based on histology (142). Advanced UCC may be treated with metastasectomy, intraoperative radiation therapy (IORT), or systemic therapy (142). ESMO guidelines recommend systemic therapy alone (145). Non UCC is treated per guidelines of similar histology. For example, UC is treated as gastrointestinal adenocarcinoma (142). Advanced bladder cancer has poor outcomes and new treatment is needed (146). CRS and HIPEC may have a role in PC for UC (3).

Literature review

One publication was found while two studies overlap with other cancer types as summarized in *Table 1* (9,38,95). Two studies treated UC with CRS and HIPEC (9,95). Honoré *et al.* (n=3) treated patients with median PCI of 11, median follow-up of 20 M, and one death at 14 M (95). Two patients are disease free at 20 and 37 M (95). Goéré *et al.* (n=35) reported HR by cancer type including UC (1.00, Ref) indicating a relative benefit (9). Li *et al.* treated UCC with systemic therapy and local resection with continued progression (38). HIPEC and CRS may be beneficial in UC, while the benefit in UCC is unknown, larger trials are needed.

Kidney

In the US, kidney cancer affects 1 in 47–82 with 16–30% presenting with advanced disease (104,147). Clear cell accounts for 75% of renal cell carcinoma (RCC) (148). PC is rare and only described in case reports (149).

Treatment

NCCN guidelines for advanced disease are based on histology of RCC (150). Clear cell is treated with surgical metastasectomy, radiation, ablative, and systemic therapies (150). ESMO guidelines are similar but only recommend systemic therapy for uncontrolled disease (151). Systemic treatment is determined by risk stratification (151). Overall, non clear cell treatment for advanced disease is similar to clear cell (152). The role of CRS and HIPEC with PC is unknown.

Literature review

One publication was found while two studies overlap with other cancer types as summarized in *Table 1* (39,55,95). A nephroblastoma (NB) patient was treated with CRS and HIPEC with PCI of 4 and death at 5 M (95). A second NB was treated with complete CRS and HIPEC with recurrence at 3 M and alive at 8 M (55). Pandey *et al.* (n=1) treated RCC with CRS and systemic therapy with progression-free survival (PFS) 8 M with OS 16 M (39). More data is required for CRS and HIPEC in kidney malignancy.

Sarcoma

General sarcoma

Sarcomas can be divided into soft tissue sarcoma (STS) and bone sarcoma (153). In the US, 1% of cancers are STS with 15% with advanced disease and 5-year survival of 16% (154). There are more than 50 histologic subtypes including:

leiomyosarcoma or gastrointestinal stromal tumor (GIST) (23–24%), liposarcoma (11–20%), rhabdomyosarcoma (RMS) (5%), Ewing's sarcoma (ES) (2–3%), and DSRCT (<1%) (155,156). PC occurs in 2–19% (157,158).

Treatment

According to NCCN guidelines advanced disease is treated with: radiation, chemotherapy, surgical resection, embolization, ablation and/or other systemic therapies (159). Special considerations are given to GIST, desmoid tumors, ES, and RMS. RMS has pleomorphic and non-pleomorphic subtypes. Non-pleomorphic RMS should be treated under specialist care (159). ESMO guidelines for advanced disease recommend treatment with surgery and chemotherapy (histology specific) (160). Special considerations are given to retroperitoneal sarcomas, uterine sarcomas, desmoid tumors, and breast sarcomas (160). Complete CRS in PC may be beneficial in leiomyosarcoma and liposarcoma (3). The role of CRS in PC in other malignancies is unknown, while HIPEC requires further evaluation (3).

Literature review

Seven publications were found while nine studies overlapped with other cancer types as summarized in *Table 1* (9,46,47,55,59,69-77,95,98). 11 studies reported the use of CRS and HIPEC in various sarcomas (9,47,55,59,69-73,95,98). Hayes-Jordan *et al.* reported a mixed cohort of sarcoma: RMS (n=2), undifferentiated (n=2), and ES (n=1) (47). All had complete CRS with mOS 12.52 M and median recurrence-free survival (mRFS) of 4.5 M (47). Karamveri *et al.* reported a mixed cohort: liposarcoma (n=7), leiomyosarcoma (n=4), RMS (n=5), ovarian sarcoma (n=4) (70). Overall patients had mOS 55 M and mRFS 9 M (70). Naffouje *et al.* reported a mixed cohort: liposarcoma (n=15), leiomyosarcoma (n=4), DSRCT (n=2), angiosarcoma (n=1), PEComa (n=1), histiocytoma (n=1), and carcinosarcoma (n=1) (71). Improved survival was associated with low *vs.* high simplified peritoneal sarcomatosis score (SPSS) (mOS, 36 *vs.* 16 M, P=0.021) (71). Abu-Zaid *et al.* reported a mixed cohort: liposarcoma (n=7), leiomyosarcoma (n=1), ES (n=1), GIST (n=2) (72). Overall patients had mOS 28.3 M and mRFS 18 M (72). Spiliotis *et al.* reported a mixed cohort: liposarcoma (n=4, mOS 12 M, mRFS 10 M), leiomyosarcoma (n=2, OS 28–33 M, RFS 0–16 M), fibrosarcoma (n=1, OS 4 M, RFS 0 M), and RMS (n=1, OS 12 M, RFS 0 M) (73). Zmora *et al.* (n=3) treated RMS with mRFS 28–29 M (n=2) and OS 7 M (n=1) (55). Scalabre *et al.* treated RMS (n=1) reporting OS 17.5 M and ES (n=1) reporting PFS of 12.6 M (59). Honoré *et al.* treated RMS with PCI of 6 and OS after HIPEC 15 M (95). Brandl *et al.* (n=1) treated malignant peripheral nerve sheath tumor with PFS 5.3 M with OS 10 M (98). Gesche *et al.* (n=6) treated RMS with RFS 7–41 M (69). Goéré *et al.* (n=166) treated a mixed cohort reporting HR by tumor type including: sarcoma (1.81, 1.01–3.25) and ovarian with (0.82, 0.45–1.49) amongst others (9). IP radioimmunotherapy was evaluated after CRS in a mixed cohort including RMS (2) and ES (1) in a Phase I study (46). Four cases were reported (74-77). Kawamura *et al.* treated RMS with CRS and whole abdominopelvic radiation (WART) with RFS 3 years (74). Pleština *et al.* planned CRS for lung undifferentiated sarcoma but treatment was complicated by emergent bowel obstruction and resection and survival of 2 M (75). Li *et al.* treated epididymal liposarcoma with CRS with death at 1 year after treatment and OS 15 years (76). Lin *et al.* treated a pancreatic stromal tumor transdifferentiation into leiomyosarcoma after imatinib treatment and PC with resection and microwave coagulation showing evolution of malignancy due to treatment (77). Given tumor heterogeneity, multidisciplinary therapy can provide tailored treatment including: CRS, HIPEC, regional radiation, and/or systemic therapy. More research is needed on IP radioimmunotherapy.

GIST

GIST is the most common gastrointestinal mesenchymal malignancy. In the US, incidence is 0.70 per 100,000 (161). Most GISTs are sporadic, however, risk can be inherited or genetic (162). Primary site includes: gastric (65%), small intestine (30%), colorectal (5%) (161). The focus of this review with be small bowel GIST. 11% had PC in a population where 43% had small bowel GIST (163).

Treatment

NCCN guidelines do not differentiate treatment for advanced GIST by primary site. Tyrosine kinase inhibitor (TKI) therapy followed by resection, ablation, radiation, or changes to TKI therapy is recommended (164). ESMO guidelines are similar (165). Non--gastric GIST may not respond to TKIs compared to gastric GIST (166). Other emerging modalities of treatment include: various forms of radiation, immunotherapy, and other systemic therapies (167-169).There does not appear to be a role for HIPEC for GIST with PC (3,170).

Literature review

Six publications were found while two studies overlap with

other cancer types as summarized in *Table 1* (9,40-45,72). Goéré *et al.* treated mixed cohort with CRS and HIPEC reporting HR including: GIST (1.43, 0.72–2.84), ovarian (0.82, 0.45–1.49), and sarcoma (1.81, 1.01–3.25) amongst others (9). Abu-Zaid *et al.* (n=2 of 11) treated a mixed cohort with CRS and HIPEC with no individual results (72). Six case reports were found (40-45). Kimura *et al.* treated bowel perforation with PC with CRS and imatinib with RFS of 12 years followed by resection and use of sunitinib with RFS 24 M (40). Two other cases were similar (41,42). Ishigame *et al.* treated PC 40 M after primary resection, requiring multiple surgeries (43). Ultimately the patient progressed with liver disease with OS >99 M (43). Sugase *et al.* reported recurrence after primary resection at 24 M with PC, treated with nilotinib with PFS 57 M, followed surgical resection (44). Monobe *et al.* treated with CRS without resecting lesions <5 mm followed by imatinib with RFS 24 M (45). The role of CRS appears to be beneficial, while CRS with HIPEC requires more data.

DSRCT

DSRCT is a rare STS affecting young patients occurring in 0.3 per million (171). Five-year survival is <35% with worse outcomes for black patients (171). The primary site of DSRCT is most commonly the abdomen/pelvis but can include many other areas (171). PC occurs in 50% (172).

Treatment

NCCN and ESMO do not have specific guidelines for DSRCT (159,160). Treatment of DSRCT is multimodal with neoadjuvant chemotherapy with or without consolidation therapy including radiation or myeloablation prior to surgical resection or CRS (172,173). HIPEC remains to be evaluated, however, CRS appears beneficial with no maximum PCI score (3).

Literature review

Nineteen publications were found as summarized in *Table 1* (48-54,56-58,60-68). Seven additional studies overlapped with other cancer types also summarized in *Table 1* (9,46,47,55,59,71,95). Fourteen publications evaluated HIPEC in various contexts. Wang *et al.* evaluated CRS and HIPEC (n=6) *vs.* CRS (n=2) with patients currently alive with disease (8.4–20.3 *vs.* 7.5–22.6 M) (48). Stiles *et al.* (n=10) evaluated CRS and HIPEC with mOS of 45 M, however, there was heterogeneity in multimodal treatment (49). Honoré *et al.* (n=100) evaluated outcomes in DSRCT by treatment: chemotherapy (n=80), surgery (n=71), HIPEC or early postoperative intraperitoneal chemotherapy (EPIC) (n=17), radiation (n=26), and postoperative chemotherapy (n=54) (51). Cure was associated with female gender, PCI, stage, complete CRS, and radiation (51). Scheer *et al.* (n=60) evaluated treatment by: chemotherapy (n=60), stem cell (n=9), HIPEC (n=5), and surgery (n=40) (52). HIPEC could not be evaluated while complete *vs.* incomplete CRS showed benefit (mOS, 50.4 *vs.* 31.2 M) (52). Subbiah *et al.* (n=187) evaluated treatment by: chemotherapy (n=183), surgery (n=114), HIPEC (n=82), and radiation (n=91) (54). Survival benefit was associated with surgery and radiation, but not HIPEC (54). Honoré *et al.* (n=48) evaluated outcomes after complete CRS also treated by: chemotherapy (n=38), radiation (n=23), HIPEC or EPIC (n=11) (57). Only WART was associated with improved survival (57). Somashekhar *et al.* (n=1) evaluated CRS and HIPEC in a mixed cohort, with no individual results (62). Honoré *et al.* (n=4) evaluated CRS and HIPEC in a mixed cohort with median PCI of 21, RFS 11-16 M, median follow-up after HIPEC of 29 M, and 3 deaths (95). Goéré *et al.* (n-34) evaluated CRS and HIPEC in a mixed cohort reporting HR by etiology including: DSRCT (2.29, 1.13–4.65), sarcoma (1.81, 1.01–3.25), and ovarian cancer (0.82, 0.45–1.49) (9). Hayes-Jordan *et al.* (n=14) conducted a Phase II trial with CRS and HIPEC with mOS 58.44 M (47). Zmora *et al.* (n=1) evaluated CRS and HIPEC in a mixed cohort with OS of 21 M (55). Naffouje *et al.* (n=4 of 25) evaluated CRS and HIPEC in a mixed cohort with benefit of low *vs.* high SPSS (mOS, 36 *vs.* 16 M, P=0.021) (71). Scalabre *et al.* (n=7) evaluated CRS and HIPEC with chemotherapy with mean OS of 16.46 M (59). Osborne *et al.* (n=32) evaluated CRS, HIPEC, WART, and chemotherapy with mOS 60 M (61). Five studies evaluated CRS, chemotherapy, and radiation (50,53,56,58,60). Gani *et al.* (n=485) evaluated outcomes by treatment including: surgery (n=200), chemotherapy (n=415), and radiation (n=63) (50). Regression showed improved OS with surgery, chemotherapy, and radiation (50). Stiles *et al.* (n=125) evaluated the benefit of CRS (mOS, 31.3 *vs.* 18.3 M, no significance) (53). Multimodal treatment was effective with CRS, chemotherapy, and radiation *vs.* no treatment (mOS, 28.8 *vs.* 8.4 M, P<0.001) (53). Angarita *et al.* (n=20) evaluated outcomes after CRS (n=5), radiation (n=3), and chemotherapy (n=20) with significantly improved OS after CRS with HR (0.1, 0.3–0.7, P<0.02) (56). Frank *et al.* (n=1) evaluated a mixed cohort treated with CRS and chemotherapy with OS 20.4 M (58). Atallah *et al.* (n=49) evaluated complete CRS with and without radiation (mOS, 40.3 *vs.* 28.3 M, no significance) (60). Modak *et al.* (n=48) evaluated the safety of CRS followed by IP

radioimmunotherapy in a mixed cohort in a Phase I trial (46). Five case reports followed patients after CRS, HIPEC, chemotherapy, radiation, and/or radioembolization with four patients alive at publication (63-66,68). Recurrence after CRS and HIPEC was treated with CRS, radioembolization, chemotherapy, and/or autologous hematopoietic cell transplant (64-66,68). Nacef *et al.* did not use HIPEC as part of therapy with continued progression on systemic chemotherapy (67). Overall, there is a consistent benefit of CRS, chemotherapy, and radiation while the benefit of HIPEC is unclear. IP radioimmunotherapy may offer a significant tool in the future radiosensitivity.

Hepatobiliary

Hepatocellular carcinoma (HCC)

In the US, liver cancer is a common cause of cancer death (11.4–12.5 per 100,000) with 3% presenting with advanced disease (104). HCC constitutes over 75% of liver malignancies (174). Increased risk is associated with: male gender, race, geographic location, hepatitis B and C virus, aflatoxins, smoking, alcohol, and non-alcoholic fatty liver disease (NAFLD) (174,175). In meta-analyses, *PNPLA3* gene variant is associated with Hispanic race, alcoholic liver cirrhosis, NAFLD, and HCC (176-178). Five-year survival for HCC is 18.2% (179). Four percent of advanced patients have PC (180).

Treatment

According to NCCN guidelines, advanced HCC is treated with systemic therapy, clinical trials, or supportive care (181). ESMO guidelines are similar (182). Other options include targeted therapies and immunotherapies (183). The role of CRS and HIPEC for PC is unclear (3).

Literature review

Six publications were found while two studies overlap with other cancer types as summarized in *Table 1* (9,78-83,93). Six studies evaluated CRS and HIPEC in various contexts (9,78-80,83,93). Goéré *et al.* (n=19) evaluated a mixed cohort reporting HR including: HCC (0.77, 0.29–2.03), sarcoma (1.81, 1.01–3.25), and ovarian cancer (0.82, 0.45–1.49) (9). Leigh *et al.* (n=9) evaluated a mixed cohort with mOS 42 M (93). Mehta *et al.* (n=21) compared complete and incomplete CRS with HIPEC (mOS, 46.7 *vs.* 5.9 M) (78). Berger *et al.* (n=22) evaluated CRS with and without HIPEC (mOS, 29.7 *vs.* 19.5 M, p=0.32) (79). Ji *et al.* reported a case treated with CRS and HIPEC followed by IP and IV chemotherapy with RFS 22 M (80). Spiliotis *et al.* (n=4) achieved PFS of 2–28 M (n=3) and one death with OS of 14 M (83). Two other cases were reported. Takase et al reported five surgical resections of PC followed by systemic therapy extending survival 2 years (81). Takiuchi *et al.* reported use of CRS, systemic therapy, radiotherapy, and chemoembolization with death at 15 M after PC (82). CRS with HIPEC appears to be beneficial with the possibility of additional benefit with adjuvant IP and IV chemotherapy, however, larger studies are needed.

Fibrolamellar hepatocellular carcinoma (FHCC)

FHCC is a variant of HCC with incidence of 0.02 per 100,000 in the US (184). Patients are typically young, have a single lesion, and normal alpha fetoprotein (185). Patients have mOS of 32.9 M with more than 20% with advanced disease (184). Eighteen percent have PC with advanced disease (186,187).

Treatment

NCCN does not provide specific recommendations for FHCC given its rarity (181). ESMO guidelines are also lacking (182). Aggressive surgical therapy, liver transplant, radiation, and investigational therapies may be beneficial while chemotherapy has no benefit (185,188). CRS and HIPEC may not improve survival in FHCC with PC, although data is limited at this time (3).

Literature review

One publication was found while one study overlaps with other cancer types as summarized in *Table 1* (84,95). Honoré *et al.* (n=3) evaluated CRS and HIPEC in a mixed cohort with median PCI of 7, median follow-up after HIPEC of 37 M, and one deceased patient (95). Distant metastatic disease was reported at 13 M (95). Kyziridis *et al.* (n=1) reported treatment with CRS and HIPEC with RFS 12 M (84). CRS and HIPEC needs further evaluation in larger studies. Distant recurrence remains an issue.

Cholangiocarcinoma (CCA)

Globally, CCA is the second most common liver malignancy (15%) classified by anatomy into intrahepatic, hilar, and extrahepatic types (174,189,190). In the US, intrahepatic (65%) is more common (189). Up to 28% of patients may present with advanced disease with mOS of 4.5 M (191). PC occurs in more than 44% (192).

Treatment

According to NCCN Guidelines, CCA management depends on anatomic location of the primary tumor (181). Advanced disease may be treated with biliary drainage, systemic therapy, radiation, or clinical trials (181). ESMO has similar recommendations (193). The role of CRS and HIPEC for PC is unclear (3).

Literature review

Four publications were found through review while seven studies overlap with other cancer types as summarized in *Table 1* (9,85-88,92-94,96-98). Four studies evaluated CRS and HIPEC in CCA (9,85,93,98). Amblard *et al.* (n=55) evaluated CRS and HIPEC *vs.* chemotherapy alone with mOS (21.4 *vs.* 9.3, P<0.007) (85). Leigh *et al.* (n=4) achieved mOS of 19 M (93). Goéré *et al.* (n=39) evaluated a mixed cohort reporting HR including: CCA (2.85, 1.45–5.6), HCC (0.77, 0.29–2.03), and DSRCT (2.29, 1.13–5.6) (9). Brandl *et al.* (n=1) recorded survival after treatment of 12.7 M (98). Five studies evaluated PIPAC (86,92,94,96,97). Di Giorgio *et al.* (n=6) achieved mOS from 1st PIPAC of 10.9 M and mOS of 12.3 M (92). Graversen *et al.* (n=2) evaluated safety in mixed cohort in a Phase I study (94). Horvath *et al.* (n=6) evaluated a mixed cohort achieving mOS 15.1 M from 1st PIPAC (96). Falkenstein *et al.* (n=8) achieved mOS from 1st PIPAC of 4 M (86). Kurtz *et al.* (n=9) reported feasibility of PIPAC in a mixed cohort (97). Two cases were reported. Hernandez *et al.* reported treatment with CRS and HIPEC with RFS 12 M (88). Stefano *et al.* reported unresectable CCA with PC treated with CRS, HIPEC, and intraoperative reversible electroporation with chemotherapy (87). Patient recurred in new lesions treated with radioembolization or chemoembolization, with PFS of 12 M (87). Current evidence supports CRS and HIPEC while other therapies such as PIPAC and electrochemotherapy require further evaluation.

Gallbladder carcinoma (GC)

In the US, GC occurs in 1.13 per 100,000 and deaths in 0.62 per 100,000 with female predominance globally (194,195). Native American and Hispanic background has worse survival (194). Subtypes include: adenocarcinoma (88%), others (10%), and squamous cell carcinoma (1%) (194). Overall, patients have mOS of 10 M (196). Five-year survival in advanced GC is 2% (195). PC occurs in 26% of advanced patients (197).

Treatment

According to NCCN guidelines, advanced GC may be treated with systemic therapy, clinical trials, and supportive care (181). ESMO guidelines do not differentiate between GC and CCA in advanced disease (193). The role of CRS and HIPEC for PC remains controversial (3).

Literature review

One publication was found while two studies overlap with other cancer types as summarized in *Table 1* (86,89,93). Leigh *et al.* (n=3) evaluated CRS and HIPEC with mOS 8 M and 13 M OS with complete CRS (n=1) (93). Falkenstein *et al.* (n=5) achieved mOS from 1st PIPAC of 2.36 M (86). Poor survival may be due to lack of strict exclusion criteria. Mikuriya *et al.* reported treatment with palliative hepatectomy, bile duct resection, lymph node dissection, and cholangiojejunostomy to improve chemotherapy adherence with reduced risk of cholangitis (89). Patient continues to survive over 24 M (89). CRS, HIPEC, and PIPAC require further evaluation.

Adrenal

ACC

In the US, ACC occurs in 2.92 per million with 5-year survival of 30% and 40% of patients with advanced disease (198). ACC may present with three histologic subtypes: oncocytic, myxoid, and a very aggressive sarcomotoid subtype (199). PC occurs in 6–19% of patients with advanced disease (200).

Treatment

NCCN guidelines recommend the following in advanced ACC: resection if >90% removable, local therapy (radiation, ablation, or liver-directed therapy), and systemic therapy (201). ESMO guidelines are similar (202). In PC, CRS offers benefit in select patients while HIPEC is controversial (3).

Literature review

Two publications were found while one study overlaps with other cancer types as summarized in *Table 1* (90,91,95). Honoré *et al.* (n=4) evaluated CRS and HIPEC or EPIC in a mixed cohort with median PCI 11, mRFS 12 M, and median follow-up after HIPEC of 40 M with 3 patients deceased (95). Hughes *et al.* (n=9) evaluated CRS and HIPEC achieving median IP PFS 19 M (90). Sugarbaker *et al.* reported the treatment of ACC with CRS and HIPEC twice with RFS of 4 M, however, this represented a new lesion in the contralateral adrenal gland treated with resection and HIPEC with no PC upon surgery (91). CRS and HIPEC should be evaluated in larger studies to verify benefit.

NET of any primary site

NET

In the US, NETs occur in 6.98 per 100,000 (203). Primary site and grade affect 5-year survival rates: cecum (61%), colon (29–64%), lung (32–60%), pancreas (48–50%), rectum (28–87%), small intestine (69–73%), and stomach

(32–67%) (203,204). Gastric and large intestine NETs are not covered in this review. Advanced disease occurs in 1.5 per 100,000 (203). PC occurs in 18% of patients with advanced disease (205,206).

Treatment

According to NCCN guidelines, initial treatment of NETs is determined by primary site. Advanced disease treatment includes: surgical resection, somatostatin analogues, peptide receptor radionuclide therapy (PRRT), liver directed therapy, radiation, or other systemic therapies (201). ESMO guidelines are similar, however, include liver transplant as an option (207). In PC, CRS may only benefit patients with grade I and II well-differentiated tumors, while the role of HIPEC remains controversial (3,208).

Literature review

Two publications were found while two studies overlap with other cancer types as summarized in *Table 1* (9,98,102,103). Brandl *et al.* (n=1) evaluated CRS and HIPEC in a mixed cohort with RFS of 13.5 M and continued survival of 48.9 M (98). Goéré *et al.* (n=114) evaluated CRS and HIPEC in a mixed cohort reporting HR including: NETs (1.41, 0.77–2.58), sarcoma (1.81, 1.01–3.25), and ovarian (0.82, 0.45–1.49) (9). Pastrián *et al.* reported CRS liver NET with PC with recurrence and OS of 30 M (102). Nagaro *et al.* reported pancreatic NET treated with CRS with no evidence of disease for 2 years (103). CRS offers benefit in select patients while CRS and HIPEC may have some benefit, however, larger trials are required.

Summary

PC commonly occurs (>20%) with treatment limited to palliation for cancers including: PDAC, SBA, UC, UCC, Sarcoma, DSRCT, CCA, and GC. PC may occur (>10%) with unclear management for cancers including: GIST, FHCC, ACC, and NET. PC rarely occurs in some common cancers with unclear management for: breast, prostate, kidney, and HCC.

PC from uncommonly treated malignancies require further consideration. CRS with multidisciplinary treatment (TKIs, radiation, chemotherapy, radio-immunotherapy, or other systemic therapies) appears to offer benefit with cancers: GIST, DSRCT, FHCC, and NETs. CRS and HIPEC may offer benefit but require larger validation with cancers: breast, SBA, UC, sarcoma, HCC, CCA, and ACC. There is not enough information for cancers: prostate, UCC, kidney, and GC. Causes of PC are heterogeneous and require tailored multidisciplinary treatment based on tumor histology and response to treatment which may include CRS and various forms of IP therapy.

In the future, clinical practice may be altered based on preliminary results. PDAC may benefit from staged IP chemotherapy and/or PIPAC. IP radioimmunotherapy or IORT may be useful for patients with radio-sensitive malignancy such as prostate, kidney, sarcoma, and DSRCT but require more research. PIPAC and electrochemotherapy may be useful in chemosensitive and/or chemoresistant malignancy but will require continued research.

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Supplementary

Search criteria

A comprehensive and selective search methodology was created by successive searches of specific primary cancers using an iterative process. Final publications were excluded if they only focused on systemic therapy, diagnostic, duplicate, not peritoneal carcinomatosis, or otherwise outside of scope.

The following primary cancers were excluded initially as they are outside of the scope of this review:

- Appendiceal or pseudomyxoma peritonei, colon and colorectal, gastric, gynecologic, and mesothelioma.

The following benign, infectious, or other abdominal diseases were excluded:

- Tuberculosis, aspergillosis, coccidiomycosis, xanthoma disseminatum, fibromatosis, fibrous masses or tumors, sclerosing mesenteritis, Castleman's disease, teratoma, cystic disease or masses, lipomas, lymphangiomas, leiomyomatosis peritonealis disseminata.

Other primary malignancies were excluded including those described below due primary medical management, low number of cases, or unclear management due to the rarity of presentation:

- Central nervous system malignancies with iatrogenic peritoneal dissemination;
- Primary lung cancers with peritoneal dissemination;
- Esophageal disease with peritoneal dissemination;
- Hematological malignancy with peritoneal lymphomatosis;
- Primary skin malignancy with peritoneal dissemination;
- Oropharyngeal malignancy with peritoneal dissemination;
- Thyroid malignancy with peritoneal dissemination.

Iterative searches

Prostate

((peritoneal carcinomatosis OR peritoneal metastasis) AND (prostate)) NOT (ovarian OR endometrial OR gynecologic OR stomach OR gastric OR colorectal OR colonic OR colon OR rectum OR mesothelioma OR appendiceal OR pseudomyxoma peritonei OR rectal OR tuberculosis OR tuberculous OR fibromatosis OR aspergillosis OR appendix OR uterine OR uterus OR xanthoma disseminatum OR asbestos OR fallopian)

Pancreas

((peritoneal carcinomatosis OR peritoneal metastasis) AND (pancreas OR pancreatic)) NOT (ovarian OR endometrial OR gynecologic OR stomach OR gastric OR colorectal OR colonic OR colon OR rectum OR mesothelioma OR appendiceal OR pseudomyxoma peritonei OR rectal OR tuberculosis OR tuberculous OR fibromatosis OR aspergillosis OR appendix OR uterine OR uterus OR xanthoma disseminatum OR asbestos OR fallopian)

Liver/hepatobiliary

((peritoneal carcinomatosis OR peritoneal metastasis) AND (gallbladder OR hepatocelluar carcinoma OR liver OR hepatobiliary)) NOT (ovarian OR endometrial OR gynecologic OR stomach OR gastric OR colorectal OR colonic OR colon OR rectum OR mesothelioma OR appendiceal OR pseudomyxoma peritonei OR rectal OR tuberculosis OR tuberculous OR fibromatosis OR aspergillosis OR appendix OR uterine OR uterus OR xanthoma disseminatum OR asbestos OR fallopian OR melanoma OR medulloepithelioma OR small bowel OR small intestine OR ileum OR jejunum OR duodenum OR urachal OR urothelial OR gastrointestinal stromal tumor OR papillary thyroid OR thyroid OR serous carcinoma OR spleen OR bladder OR plasma cell OR renal cell carcinoma OR kidney OR renal OR testicle OR corticoadrenaloma OR spinal cord OR pheochromocytoma OR prostate OR pancreas OR pancreatic)

Lung

((peritoneal carcinomatosis OR peritoneal metastasis) AND (lung)) NOT (ovarian OR endometrial OR gynecologic OR stomach OR gastric OR colorectal OR colonic OR colon OR rectum OR mesothelioma OR appendiceal OR pseudomyxoma peritonei OR rectal OR tuberculosis OR tuberculous OR fibromatosis OR aspergillosis OR appendix OR uterine OR uterus OR xanthoma disseminatum OR asbestos OR fallopian OR prostate OR pancreas OR pancreatic OR gallbladder OR liver OR hepatobiliary OR hepatocellular carcinoma OR gallbladder OR brain OR CNS OR spinal cord OR breast OR neuroendocrine OR sarcoma OR anaplastic ependymoma OR lymphoma OR histiocytosis OR melanoma OR medulloepithelioma OR small bowel OR small intestine OR ileum OR jejunum OR

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duodenum OR urachal OR urothelial OR gastrointestinal stromal tumor OR papillary thyroid OR serous carcinoma OR spleen OR bladder OR plasma cell OR renal cell carcinoma OR thyroid OR kidney OR renal OR testicle OR corticoadrenaloma OR pheochromocytoma OR desmoplastic round small cell tumor)

Brain and/or central nervous system

((peritoneal carcinomatosis OR peritoneal metastasis) AND (brain OR CNS OR spinal cord OR anaplastic ependymoma OR medulloepithelioma)) NOT (ovarian OR endometrial OR gynecologic OR stomach OR gastric OR colorectal OR colonic OR colon OR rectum OR mesothelioma OR appendiceal OR pseudomyxoma peritonei OR rectal OR tuberculosis OR tuberculous OR fibromatosis OR aspergillosis OR appendix OR uterine OR uterus OR xanthoma disseminatum OR asbestos OR fallopian OR prostate OR pancreas OR pancreatic OR gallbladder OR liver OR hepatobiliary OR hepatocellular carcinoma OR gallbladder OR breast OR neuroendocrine OR sarcoma OR lymphoma OR histiocytosis OR melanoma OR small bowel OR small intestine OR ileum OR jejunum OR duodenum OR urachal OR urothelial OR gastrointestinal stromal tumor OR papillary thyroid OR serous carcinoma OR spleen OR bladder OR plasma cell OR renal cell carcinoma OR thyroid OR kidney OR renal OR testicle OR corticoadrenaloma OR pheochromocytoma OR desmoplastic round small cell tumor OR lung)

Breast

((peritoneal carcinomatosis OR peritoneal metastasis) AND (breast)) NOT (ovarian OR endometrial OR gynecologic OR stomach OR gastric OR colorectal OR colonic OR colon OR rectum OR mesothelioma OR appendiceal OR pseudomyxoma peritonei OR rectal OR tuberculosis OR tuberculous OR fibromatosis OR aspergillosis OR appendix OR uterine OR uterus OR xanthoma disseminatum OR asbestos OR fallopian OR prostate OR pancreas OR pancreatic OR gallbladder OR liver OR hepatobiliary OR hepatocellular carcinoma OR gallbladder OR neuroendocrine OR sarcoma OR anaplastic ependymoma OR lymphoma OR histiocytosis OR melanoma OR medulloepithelioma OR small bowel OR small intestine OR ileum OR jejunum OR duodenum OR urachal OR urothelial OR gastrointestinal stromal tumor OR papillary thyroid OR serous carcinoma OR spleen OR bladder OR plasma cell OR renal cell carcinoma OR thyroid OR kidney OR renal OR testicle OR corticoadrenaloma OR pheochromocytoma OR desmoplastic round small cell tumor OR lung OR brain OR CNS OR spinal cord)

Small bowel

((peritoneal carcinomatosis OR peritoneal metastasis) AND (small bowel OR small intestine OR ileum OR jejunum OR duodenum)) NOT (ovarian OR endometrial OR gynecologic OR stomach OR gastric OR colorectal OR colonic OR colon OR rectum OR mesothelioma OR appendiceal OR pseudomyxoma peritonei OR rectal OR tuberculosis OR tuberculous OR fibromatosis OR aspergillosis OR appendix OR uterine OR uterus OR xanthoma disseminatum OR asbestos OR fallopian OR prostate OR pancreas OR pancreatic OR gallbladder OR liver OR hepatobiliary OR hepatocellular carcinoma OR gallbladder OR neuroendocrine OR sarcoma OR anaplastic ependymoma OR lymphoma OR histiocytosis OR melanoma OR medulloepithelioma OR urachal OR urothelial OR gastrointestinal stromal tumor OR papillary thyroid OR serous carcinoma OR spleen OR bladder OR plasma cell OR renal cell carcinoma OR thyroid OR kidney OR renal OR testicle OR corticoadrenaloma OR pheochromocytoma OR desmoplastic round small cell tumor OR lung OR brain OR CNS OR spinal cord OR breast)

Neuroendocrine

((peritoneal carcinomatosis OR peritoneal metastasis) AND (neuroendocrine)) NOT (ovarian OR endometrial OR gynecologic OR stomach OR gastric OR colorectal OR colonic OR colon OR rectum OR mesothelioma OR appendiceal OR pseudomyxoma peritonei OR rectal OR tuberculosis OR tuberculous OR fibromatosis OR aspergillosis OR appendix OR uterine OR uterus OR xanthoma disseminatum OR asbestos OR fallopian)

Urologic

((peritoneal carcinomatosis OR peritoneal metastasis) AND (urachal OR urothelial OR bladder OR renal cell carcinoma OR kidney OR renal OR testicle)) NOT (ovarian OR endometrial OR gynecologic OR stomach OR gastric OR colorectal OR colonic OR colon OR rectum OR mesothelioma OR appendiceal OR pseudomyxoma

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peritonei OR rectal OR tuberculosis OR tuberculous OR fibromatosis OR aspergillosis OR appendix OR uterine OR uterus OR xanthoma disseminatum OR asbestos OR fallopian OR prostate OR pancreas OR pancreatic OR gallbladder OR liver OR hepatobiliary OR hepatocellular carcinoma OR gallbladder OR neuroendocrine OR sarcoma OR anaplastic ependymoma OR lymphoma OR histiocytosis OR melanoma OR medulloepithelioma OR small bowel OR small intestine OR ileum OR jejunum OR duodenum OR gastrointestinal stromal tumor OR papillary thyroid OR serous carcinoma OR spleen OR plasma cell OR thyroid OR corticoadrenaloma OR pheochromocytoma OR desmoplastic round small cell tumor OR lung OR brain OR CNS OR spinal cord OR breast)

Hematological

((peritoneal carcinomatosis OR peritoneal metastasis) AND (leukemia OR lymphoma OR histiocytosis OR plasma cell)) NOT (ovarian OR endometrial OR gynecologic OR stomach OR gastric OR colorectal OR colonic OR colon OR rectum OR mesothelioma OR appendiceal OR pseudomyxoma peritonei OR rectal OR tuberculosis OR tuberculous OR fibromatosis OR aspergillosis OR appendix OR uterine OR uterus OR xanthoma disseminatum OR asbestos OR fallopian OR serous carcioma)

Melanoma

((peritoneal carcinomatosis OR peritoneal metastasis) AND (melanoma)) NOT (ovarian OR endometrial OR gynecologic OR stomach OR gastric OR colorectal OR colonic OR colon OR rectum OR mesothelioma OR appendiceal OR pseudomyxoma peritonei OR rectal OR tuberculosis OR tuberculous OR fibromatosis OR aspergillosis OR appendix OR uterine OR uterus OR xanthoma disseminatum OR asbestos OR fallopian OR serous carcioma OR leukemia OR lymphoma OR histiocytosis OR plasma cell)

Sarcoma

((peritoneal carcinomatosis OR peritoneal metastasis) AND (sarcoma OR gastrointestinal stromal tumor OR GIST OR desmoplastic small round cell tumor OR peritoneal sarcomatosis OR liposarcoma OR leiomyosarcoma OR desmoplastic small round blue cell tumor)) NOT (ovarian OR endometrial OR gynecologic OR stomach OR gastric OR colorectal OR colonic OR colon OR rectum OR mesothelioma OR appendiceal OR pseudomyxoma peritonei OR rectal OR tuberculosis OR tuberculous OR fibromatosis OR aspergillosis OR appendix OR uterine OR uterus OR xanthoma disseminatum OR asbestos OR fallopian OR serous carcioma OR leukemia OR lymphoma OR histiocytosis OR plasma cell OR melanoma)

Adrenal

((peritoneal carcinomatosis OR peritoneal metastasis) AND (neuroblastoma OR corticoadrenaloma OR pheochromocytoma OR adrenal OR ACC OR adrenal cortical carcinoma)) NOT (ovarian OR endometrial OR gynecologic OR stomach OR gastric OR colorectal OR colonic OR colon OR rectum OR mesothelioma OR appendiceal OR pseudomyxoma peritonei OR rectal OR tuberculosis OR tuberculous OR fibromatosis OR aspergillosis OR appendix OR uterine OR uterus OR xanthoma disseminatum OR asbestos OR fallopian OR serous carcioma OR leukemia OR lymphoma OR histiocytosis OR plasma cell OR melanoma)

Thyroid

((peritoneal carcinomatosis OR peritoneal metastasis) AND (papillary thyroid OR thyroid)) NOT (ovarian OR endometrial OR gynecologic OR stomach OR gastric OR colorectal OR colonic OR colon OR rectum OR mesothelioma OR appendiceal OR pseudomyxoma peritonei OR rectal OR tuberculosis OR tuberculous OR fibromatosis OR aspergillosis OR appendix OR uterine OR uterus OR xanthoma disseminatum OR asbestos OR fallopian OR serous carcioma OR leukemia OR lymphoma OR histiocytosis OR plasma cell OR melanoma)

Esophagus

((peritoneal carcinomatosis OR peritoneal metastasis) AND (esophagus OR esophageal)) NOT (ovarian OR endometrial OR gynecologic OR stomach OR gastric OR colorectal OR colonic OR colon OR rectum OR mesothelioma OR appendiceal OR pseudomyxoma peritonei OR rectal OR tuberculosis OR tuberculous OR fibromatosis OR aspergillosis OR appendix OR uterine OR uterus OR xanthoma disseminatum OR asbestos OR

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fallopian OR serous carcioma OR leukemia OR lymphoma OR histiocytosis OR plasma cell OR melanoma)

Spleen

((peritoneal carcinomatosis OR peritoneal metastasis) AND (spleen OR splenic)) NOT (ovarian OR endometrial OR gynecologic OR stomach OR gastric OR colorectal OR colonic OR colon OR rectum OR mesothelioma OR appendiceal OR pseudomyxoma peritonei OR rectal OR tuberculosis OR tuberculous OR fibromatosis OR aspergillosis OR appendix OR uterine OR uterus OR xanthoma disseminatum OR asbestos OR fallopian OR serous carcioma)

Head and neck

((peritoneal carcinomatosis OR peritoneal metastasis) AND (head and neck OR oral OR pharynx OR nasopharynx OR oropharynx OR hypopharynx OR larynx OR nasal cavity OR paranasal sinus OR salivary gland)) NOT (ovarian OR endometrial OR gynecologic OR stomach OR gastric OR colorectal OR colonic OR colon OR rectum OR mesothelioma OR appendiceal OR pseudomyxoma peritonei OR rectal OR tuberculosis OR tuberculous OR fibromatosis OR aspergillosis OR appendix OR uterine OR uterus OR xanthoma disseminatum OR asbestos OR fallopian OR serous carcioma OR leukemia OR lymphoma OR histiocytosis OR plasma cell OR melanoma)

All other

(peritoneal carcinomatosis OR peritoneal metastasis) NOT (ovarian OR endometrial OR gynecologic OR stomach OR gastric OR colorectal OR colonic OR colon OR rectum OR mesothelioma OR appendiceal OR pseudomyxoma peritonei OR rectal OR tuberculosis OR tuberculous OR fibromatosis OR aspergillosis OR appendix OR uterine OR uterus OR xanthoma disseminatum OR asbestos OR fallopian OR serous carcioma OR prostate OR pancreas OR hepatcellular carcinoma OR lung OR brain OR breast OR anaplastic ependymoma OR liver OR lymphoma OR histiocytosis OR sarcoma OR pancreatic OR neuroendocrine OR gallbladder OR melanoma OR medulloepithelioma OR small bowel OR small intestine OR ileum OR jejunum OR duodenum OR urachal OR urothelial OR gastrointestinal stromal tumor OR papillary thyroid OR spleen OR bladder OR plasma cell OR renal cell carcinoma OR thyroid OR kidney OR renal OR testicle OR corticoadrenaloma OR spinal cord OR CNS OR hepatobiliary OR pheochromocytoma OR desmoplastic small round cell tumor OR esophagus OR adrenal OR ACC OR adrenal cortical carcinoma OR leukemia OR peritoneal sarcomatosis OR liposarcoma OR leiomyosarcoma OR GIST OR desmoplastic small round blue cell tumor OR neuroblastoma OR esophageal OR splenic OR head and neck OR oral OR pharynx OR nasopharynx OR oropharynx OR hypopharynx OR larynx OR nasal cavity OR paranasal sinus OR salivary gland)

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