



**Australian Government**

**Department of Health**

**APPLICATION CURRENTLY ON HOLD**

## **Application 1468:**

**SIR-Spheres® Y-90 resin microspheres for the treatment of hepatic metastases which are secondary to colorectal cancer and are not suitable for resection or ablation, used in combination with systemic chemotherapy**

# **PICO Confirmation**

**(to guide a new application to MSAC)**

**(Version 0.1)**

This PICO Confirmation Template is to be completed to guide a new request for public funding for new or amended medical service(s) (including, but not limited to the Medicare Benefits Schedule (MBS)). It is relevant to proposals for both therapeutic and investigative medical services.

Please complete all questions that are applicable to the proposed service, providing relevant information only.

Should you require any further assistance, departmental staff are available through the Health Technology Assessment (HTA Team) on the contact number and email below to discuss the application form, or any other component of the Medical Services Advisory Committee process.

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## Version Control

### Document History

Version Number	Date Changed	Author	Reason for Change
0.1	10 March 2016	Bianca Ledbrook	Final PICO template for publication
1.0	9 March 2017	Joanna Briggs Institute	PICO Confirmation for discussion at April 2017 PASC
2.0	20 April 2017	Joanna Briggs Institute	Edits to PICO Confirmation, based on ratified April 2017 PASC Outcomes

### Document Approval

Version Number	Date Changed	Author	Reason for Change
1.0		MSAC PASC Secretariat	Template released for publication
1.1	5 June 2017	MSAC PASC Secretariat	PICO Confirmation ratified by PASC Chair

## 1. Summary of PICO/PPICO criteria to define the question(s) to be addressed in an Assessment Report to the Medical Services Advisory Committee (MSAC)

Component	Description
Patients	Patients with hepatic metastases secondary to colorectal cancer (CRC) which are not suitable for resection or ablation.
Intervention	<ol style="list-style-type: none"> <li>1. Selective internal radiation therapy (SIRT) using SIR-Spheres® Y-90 resin microspheres in combination with systemic chemotherapy</li> <li>2. SIRT using SIR-Spheres® Y-90 resin microspheres monotherapy</li> </ol>
Comparator	<ol style="list-style-type: none"> <li>1. Systemic chemotherapy</li> <li>2. Best supportive care</li> </ol>
Outcomes	<p><b>Safety</b> Toxicity (e.g. haematologic, neutropenia, thrombocytopenia), adverse events due to the angiogram, SIRT-associated adverse events (e.g. gastric/duodenal ulcer, ascites, hepatic failure, radiation hepatitis)</p> <p><b>Efficacy / effectiveness</b> Overall survival, progression free survival, objective response rate (tumour response rate in the liver), time to progression, liver resection rate, quality of life</p> <p><b>Cost-effectiveness</b> Cost, cost per life year gained, cost per quality adjusted life year or disability adjusted life year, incremental cost-effectiveness ratio</p> <p><b>Total Australian Government healthcare costs</b></p>
Research question	What is the safety, effectiveness, and cost-effectiveness of SIRT using Y-90 resin microspheres with or without systemic chemotherapy, compared to systemic chemotherapy alone, or best supportive care in patients with non-resectable, non-ablatable hepatic metastases secondary to CRC?

## 2. PICO or PPICO rationale for therapeutic and investigative medical services only

### 2.1 Population

Colorectal cancer (CRC) is among the most frequently diagnosed cancers. Globally, in 2012, there was an estimated 1.4 million new cases of CRC diagnosed and almost 700,000 deaths occurred due to the disease (Torre et al. 2015). In Australia in 2016, an estimated 17,500 new cases of CRC were diagnosed with an estimated 4,100 deaths<sup>1</sup>. This places CRC as the second most commonly diagnosed cancer in Australia and the second most common cause of cancer-related mortality. The liver is the most common site for CRC metastases, with approximately 25% of CRC patients having hepatic metastases at their initial presentation and another 30% developing hepatic metastases during the course of their disease (Donadon et al. 2007). Without treatment, median survival of patients with CRC hepatic metastases is 12 to 15 months, and 5-year survival is less than 5% (Donadon et al. 2007). Hepatic metastases from CRC accounts for around two-thirds of CRC-related deaths (Abdalla et al. 2006; Donadon et al. 2007).

The proposed use of selective internal radiation therapy (SIRT) specified in the application is for patients with hepatic metastases secondary to CRC that are not suitable for resection or ablation. While not specified in the application, SIRT is only considered appropriate for patients with liver-only or liver-dominant metastases. In patients with liver-dominant metastases, it is important that their limited extra hepatic metastases are treatable. Patients should be fit to undergo treatment.

#### Rationale

The evidence base in the application included one randomised controlled trial comparing SIRT plus chemotherapy with FOLFOX<sup>2</sup>, plus or minus bevacizumab with chemotherapy with FOLFOX plus or minus bevacizumab alone in patients with liver-dominant CRC metastases (van Hazel et al. 2016). A scoping search identified a systematic review by Townsend et al. (2016) that included an additional three RCTs comparing SIRT plus or minus chemotherapy with chemotherapy alone (Gray et al. 2001; Hendlisz et al. 2010; Van Hazel et al. 2004).

In these trials, patients with non-resectable and non-ablatable liver-only or liver-dominant metastases were eligible for treatment (Gray et al. 2001; Hendlisz et al. 2010; Van Hazel et al. 2004). In the most recent trial of SIRT, patients with limited extra hepatic metastases (fewer than 5 lung nodules of  $\leq 1$  cm diameter or a single nodule of  $\leq 1.7$  cm diameter, and/or lymph node involvement with a single anatomic area of  $< 2$  cm diameter) were considered candidates for SIRT (van Hazel et al. 2016). Any extrahepatic metastases should be considered treatable, as progression of extra hepatic disease will limit the potential benefit of SIRT (Popperl et al. 2005). Additional eligibility criteria that may be considered when assessing a patient's suitability for SIRT include ability (fitness) to undergo treatment (e.g. WHO performance status of 0 or 1) and a life expectancy of greater than three months (van Hazel et al. 2016). There is therefore potential for the future population to be broadened to include patients with varying degrees of extrahepatic metastases (in some circumstances).

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<sup>1</sup> Available from URL <<http://www.aihw.gov.au/cancer/bowel/>>, accessed 28 February 2017

<sup>2</sup> FOLFOX consists of folinic acid, fluorouracil (5-FU) and oxaliplatin

## 2.2 Prior tests

Due to the nature of SIRT, patients must be screened to ensure their suitability. The tests these patients are likely to have are described below.

Serum chemical analyses should be performed to evaluate hepatic and renal function. Patients with irreversible elevations in serum bilirubin should be excluded from treatment with SIRT. In the presence of renal insufficiency, care must be taken to avoid or minimize the use of iodinated contrast material (Kennedy et al. 2007).

To ensure the patient has liver-dominant disease, tumour imaging should be undertaken using 3-phase contrast computed tomography, contrast-enhanced magnetic resonance imaging, and/or fluorodeoxyglucose-positron emission tomography. However, many patients will already have had one or more of these imaging tests as part of their clinical diagnostic work-up. For detecting extra-hepatic NET metastases somatostatin receptor scintigraphy may be useful, but is likely to have already been performed in these patients. If the scans were taken 3 or more months previously, new scans may be required to determine the extent of disease progression.

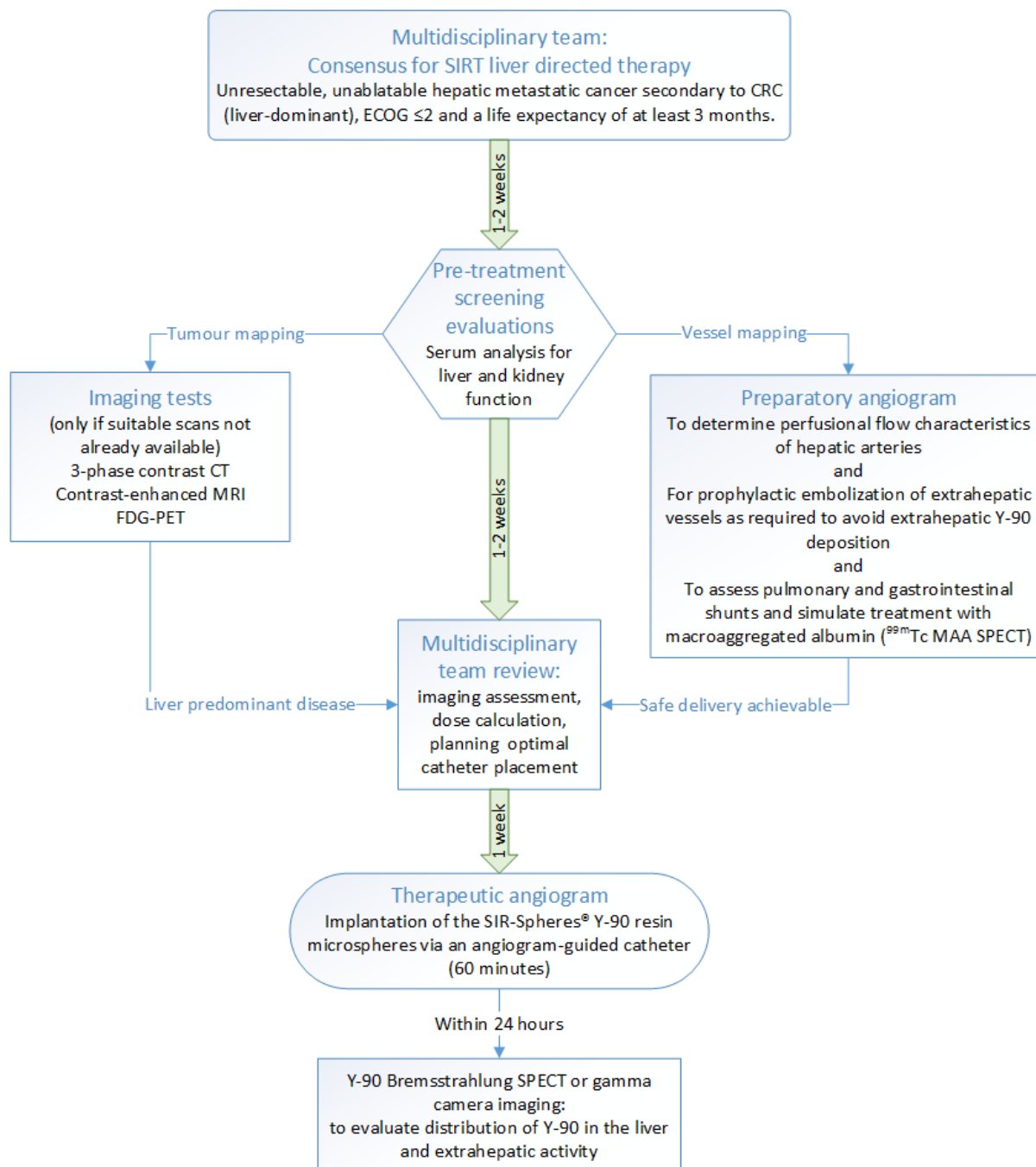
## 2.3 Intervention

The liver has a dual blood supply, and it has been demonstrated that liver tumours are predominantly supplied by the hepatic artery, whereas the normal liver parenchyma is mostly supplied by the portal vein (Kennedy et al. 2007). This dual blood supply is the basis of all transarterial approaches for the treatment of intrahepatic tumours or metastases. Both TACE and SIRT combine two different therapeutic principles delivered via the hepatic artery: targeted radiation or chemotherapy directly to the tumour, and embolisation to prevent washout of the active agent from the tumour site and to induce ischaemic necrosis by blocking or severely reducing the blood supply to the tumour (Bester et al. 2014).

SIRT uses resin or glass microspheres, usually loaded with Y-90 to deliver radiation treatment to the tumour. The microspheres aggregate and occlude the micro-vasculature of the tumour forming a point-source of radiation with a very limited range of a few millimetres (Cho et al. 2016). This results in reduced radiation exposure to the surrounding normal tissue. The proposed medical service associated with this application is for SIRT using Y-90 resin microspheres (SIR-Spheres®); the only SIRT agent listed on the Australian Register of Therapeutic Goods (ARTG).

As discussed above, most of the tests required to determine initial suitability for SIRT will have been undertaken as part of the patient's initial diagnostic work-up. If any additional information is required, the tests would be undertaken either prior to, or concurrent with, the preparatory angiogram, (Figure 1).

Patients thought to be suitable for SIRT therapy would be required to have two hepatic angiograms (Figure 1). The preparatory angiogram is undertaken to determine perfusional flow characteristics of the hepatic arteries. During this angiogram, prophylactic embolisation of any extrahepatic vessels is conducted in order to avoid extrahepatic deposition of Y-90 microspheres. Assessment of the pulmonary and gastrointestinal shunts during simulated treatment with <sup>99m</sup>Techetium macroaggregated albumin (detected by single-photon emission computed tomography) is also undertaken to ensure correct and safe delivery of the microspheres is possible. The preparatory angiogram is normally done on an outpatient basis.



**Figure 1 Treatment algorithm for SIRT**

Source: Kennedy et al. (2007)

Pre-treatment screening tests to determine suitability for SIRT undertaken only if sufficient information is not available from the initial diagnostic work-up of the patient.

Y-90 = Yttrium-90; <sup>99m</sup>Tc = Technetium-99m; CT = computed tomography; ECOG = Eastern Cooperative Oncology Group performance status; FDG = fluorodeoxyglucose; MRI = magnetic resonance imaging; PET = positron emission tomography; SIR = selective internal radiation; SPECT = single-photon emission computed tomography;

If safe delivery is possible, the patient will have a second therapeutic angiogram to implant the Y-90 resin microspheres into the liver (Figure 1). The catheter used during the angiogram is guided by the interventional radiologist through the artery and placed close to the tumours in the liver. The Y-90 resin microspheres are then infused through a catheter into the liver. For this procedure, the patient is admitted to hospital and it usually takes about 60 minutes.

The applicant has proposed that SIRT be used in combination with systemic chemotherapy, and the current item descriptors specifically mention chemotherapy using 5-fluorouracil (5FU) and leucovorin. However, according to current guidelines from the European Society for Medical Oncology (ESMO) and the National Comprehensive Cancer Network (NCCN), this is no longer considered the standard treatment for metastatic CRC. Current systemic chemotherapy regimens for treatment of metastatic CRC are summarised in Table 1.

**Table 1 Chemotherapy options for advanced or metastatic CRC (NCCN and ESMO guidelines)**

Initial therapy	After first progression	After second progression
FOLFOX +/- bmab or cetux/pmab <sup>a</sup> CAPOX +/- bmab or cmab/pmab <sup>a</sup>	Irinotecan +/- bmab or aflib or cmab/pmab <sup>a</sup> FOLFIRI +/- bmab or aflib or cmab/pmab <sup>a</sup>	Irinotecan + cmab or pmab <sup>1</sup> Regorafenib <sup>b</sup>
FOLFIRI +/- bmab or cmab/pmab <sup>a</sup>	FOLFOX +/- bmab CAPOX +/- bmab Irinotecan + cmab/pmab <sup>a</sup>	CAPOX FOLFOX Irinotecan + cmab/pmab <sup>1</sup> Regorafenib <sup>b</sup>
Bmab + 5-FU/LV or Cape or FOLFOXIRI	Bmab + FOLFOX/FOLFIRI/Irinotecan/CAPOX Bmab + Irinotecan + Oxaliplatin Aflib + FOLFIRI/Irinotecan Irinotecan + cmab/pmab <sup>a</sup> Regorafenib <sup>b</sup>	Irinotecan + cmab/pmab <sup>1</sup> FOLFOX CAPOX Regorafenib <sup>b</sup>

Source: Adapted from Sag, Selcukbiricik & Mandel. (2016)

<sup>a</sup> KRAS/NRAS wild type gene only

<sup>b</sup> Regorafenib is not currently listed on the PBS

Bmab = Bevacizumab; Cape = Capecitabine; CAPOX = capecitabine combined with oxaliplatin; Cmab = Cetuximab; FOLFIRI = folinic acid (leucovorin), fluorouracil and irinotecan; FOLFOX = folinic acid (leucovorin), fluorouracil and oxaliplatin; Pmab = Panitumumab; Aflib = Aflibercept.

The application does not clearly specify at which line of therapy SIRT should be considered. During a teleconference with the department, the applicant and the health technology assessment group on 22 February 2017, the applicant clarified that the proposal was that SIRT could be used in conjunction with chemotherapy for any line of therapy. Some studies in the evidence base have used SIRT as part of first-line therapy, in combination with systemic chemotherapy (Van Hazel et al. 2004; van Hazel et al. 2016), while other studies have used SIRT at later lines of therapy (Hendlisz et al. 2010). The service must be performed by a specialist or consultant physician recognised in the specialties of nuclear medicine or radiation oncology and is expected to be used only once for each patient, regardless at which line of therapy SIRT is used.

This treatment is already available for Australian patients with non-resectable primary or secondary liver-dominant metastatic cancer. In the private sector, it is funded under the reimbursement code for SIR-Spheres® on the Prosthesis List, and in public hospitals, the funding mechanism varies from State to State.

### Rationale

The assessment report for MSAC application 1082 SIR-Spheres for the treatment of non-resectable liver tumours, which was prepared by MSAC and endorsed by the Minister for Health and Ageing on 28 November 2005, found that there would be instances when SIRT may be used as a standalone treatment; for example, in chemotherapy refractory disease. Thus, SIRT using SIR-Spheres® Y-90 resin microspheres monotherapy should be included as an alternative intervention.

The applicant has indicated that the proposed service would only be used once per lifetime. However, Zarva et al. (2014) reported that in advanced liver tumours, repeated whole-liver treatments with SIRT can be performed with an acceptable toxicity profile. Additionally, TACE, a similar locoregional therapy that is also delivered via the hepatic artery is regarded to be a repetitive procedure (Zarva et al. 2014). This suggests that use of SIRT may be subject to leakage (i.e. more than one procedure may be performed and claimed per individual).

### *Indications and contraindications*

The decision on the suitability of a patient with non-resectable hepatic neoplasms for SIRT should be made by a multidisciplinary team composed of specialists in interventional radiology, nuclear medicine, radiotherapy, medical and surgical oncology, and transplantation medicine, since a wide variety of conditions and parameters have to be considered (Hoffmann et al. 2011). Due to possible liver toxicity, it is crucial to exclude patients with significantly impaired liver function to prevent further deterioration or even complete liver failure. The most often used laboratory parameter to evaluate liver function with respect to suitability for SIRT is total bilirubin. The decision to use SIRT also requires a complete staging of disease by anatomical and/or functional imaging to exclude patients with significant extrahepatic tumour spread, which is a contraindication in most situations. The indications and contraindications for suitability to undergo SIRT are summarised in Table 2.

**Table 2 Indications and contraindications for suitability to undergo SIRT**

<b>Indications</b>	<b>Contraindications</b>
Tumours not suitable for surgical resection	Tumour volume more than 50% of liver volume
Tumours not suitable for local ablative therapy (radiofrequency or laser ablation)	Complete occlusion of the portal vein
Patients not eligible for transplantation	Liver–Lung shunt of more than 20%
Life expectancy of more than 3 months	Bilirubin of more than 1.8 mg/dL
Good performance status (Karnofsky score of more than 70%, ECOG performance status 0-2)	Liver cirrhosis Child Pugh B/C
Angiographically suitable access to the hepatic vasculature	Relevant extrahepatic metastatic disease

Source: Hoffman et al. (2011)

## **2.4 Comparator**

As the current standard of care for patients with non-resectable, non-ablatable CRC metastases is systemic chemotherapy, this is the correct comparator for SIRT. In current guidelines, systemic chemotherapy regimens vary depending on whether the patient is fit to undergo intensive chemotherapy, the intention of treatment (e.g. conversion therapy or controlling disease progression), and on the mutation status of the tumour (Dervenis et al. 2016; Edwards et al. 2012; Sag, Selcukbiricik & Mandel 2016; Van Cutsem et al. 2016). Preferred choice of systemic chemotherapy may be based on the Zurich treatment algorithm, and generally includes chemotherapy doublet (e.g. FOLFOX or FOLFIRI) plus epidermal growth factor receptor (EGFR) antibody or bevacizumab, or FOLFOXIRI ± bevacizumab (Van Cutsem et al. 2016).

### Rationale

Four RCTs have been identified that compared SIRT plus chemotherapy (systemic or hepatic arterial chemotherapy [HAC]) with chemotherapy alone in patients with liver-dominant CRC metastases (Gray et al. 2001; Hendlisz et al. 2010; Van Hazel et al. 2004; van Hazel et al. 2016). *These RCTs*



*provide some comparative evidence to assess the effectiveness of SIRT in combination with chemotherapy compared with chemotherapy alone.*

One trial compared SIRT and fluorouracil and leucovorin (5FU/LV) with 5FU/LV alone as first-line therapy in 21 patients (Van Hazel et al. 2004). When this trial was conducted, 5FU/LV was standard first-line systemic chemotherapy for patients with hepatic metastases from CRC. Current systemic chemotherapy regimens generally include additional or alternative cytotoxic agents, often in combination with biologic therapies (see Table 1).

The most recent RCT was an international, multi-centre, open label trial that compared SIRT and mFOLFOX ± bevacizumab with mFOLFOX ± bevacizumab as first-line therapy in 530 patients (van Hazel et al. 2016). In addition, there are two ongoing phase III, open-label RCTs (FOXFIRE and FOXFIRE Global) that are investigating the use of SIRT plus FOLFOX (± bevacizumab or cetuximab) versus FOLFOX (± bevacizumab or cetuximab). The results of these trials are expected later this year. Beyond first-line, one RCT included 44 patients that compared SIRT and systemic chemotherapy (fluorouracil) to systemic chemotherapy alone as third-line treatment of chemotherapy refractory disease (Hendlisz et al. 2010). The other RCT including 74 patients compared SIRT and HAC (floxuridine) with HAC alone (Gray et al. 2001). The majority of patients (63) had not received any prior first-line therapy.

The assessment report for MSAC application 1082 *SIR-Spheres for the treatment of non-resectable liver tumours* found that there would be instances when SIRT may be used as a standalone treatment, for example in chemotherapy refractory disease. For these patients best supportive care would be the appropriate comparator. A multi-centre phase II clinical trial evaluated SIRT for 50 patients who had failed previous oxaliplatin and irinotecan-based systemic chemotherapy regimens (Cosimelli et al. 2010), however there was no control group in this trial. *There may be limited evidence available for SIRT compared with best supportive care in this population.*

## 2.5 Outcomes

The overall clinical claim is for superior clinical effectiveness and safety of SIRT using Y-90 resin microspheres compared with the comparators.

Liver metastases often affect the patient's quality of life due to decreased liver function and ultimately are the cause of death for many patients. *Thus, the focus of treatment (including SIRT) in some patients may be to decrease the size of the liver metastases such that the patient becomes suitable for potentially curative resection or as a bridge to transplantation. This is captured in the 'objective response rate' outcome below. Objective response can be measured using mRECIST and EASL criteria for liver metastases (see Appendix 1).*

### Patient relevant

**Clinical effectiveness:** Overall survival, progression free survival (PFS), objective response rate (tumour response rate in the liver), time to progression, liver resection rate, quality of life

**Safety:** Adverse events due to the angiogram, toxicity (e.g. haematologic, neutropenia, thrombocytopenia), SIRT-associated adverse events (e.g. gastric/duodenal ulcer, ascites, hepatic failure, radiation hepatitis)

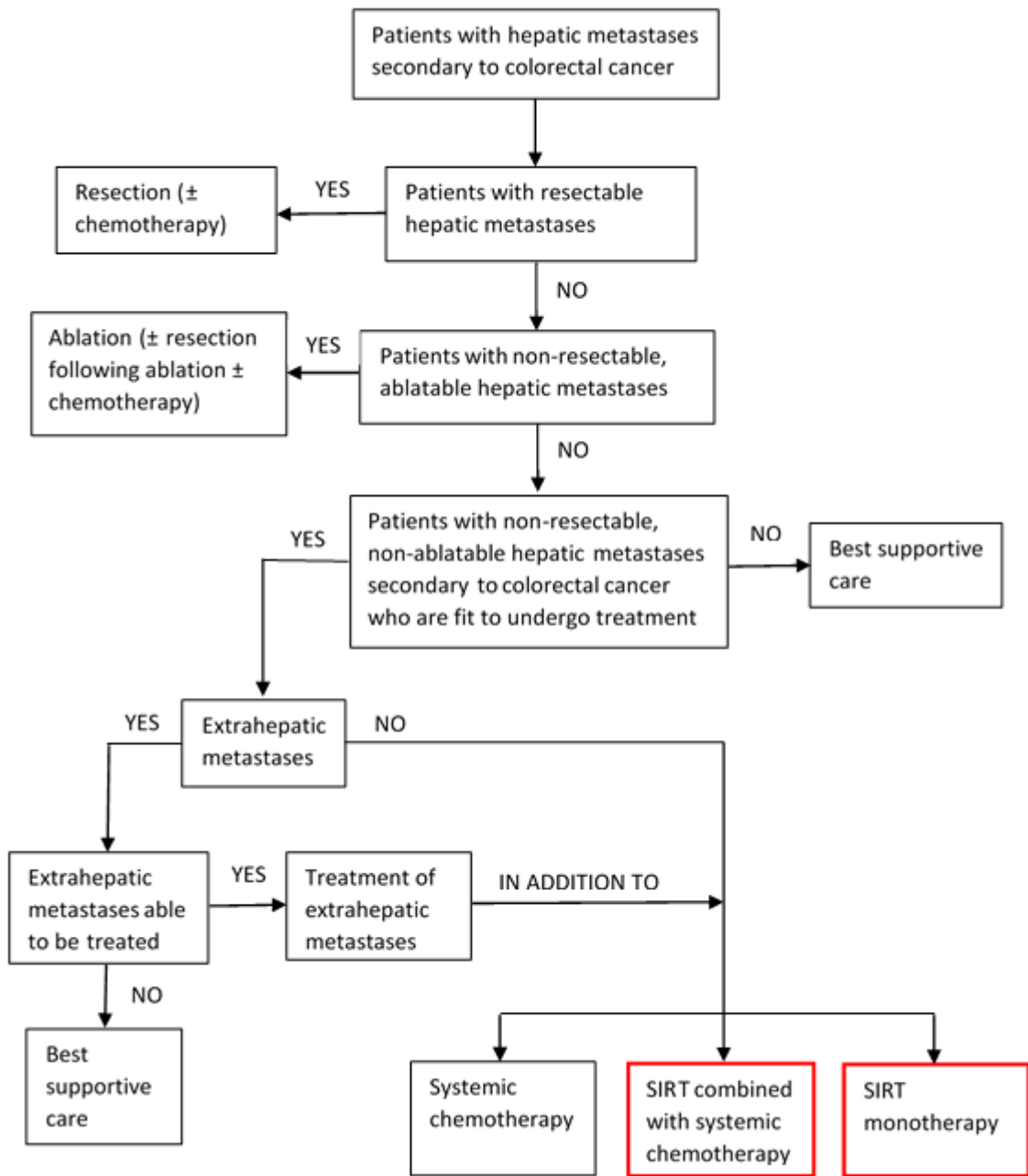
## Healthcare system

*Cost-effectiveness:* Cost, cost per life year gained, cost per quality adjusted life year or disability adjusted life year, incremental cost-effectiveness ratio

*Financial implications:* Number of patients suitable for treatment, number of patients who have “preparatory” angiogram, number of patients who receive treatment

### **3. Current and proposed clinical management algorithm for identified population**

The current clinical management algorithm for patients with non-resectable, non-ablatable hepatic metastases secondary to CRC involves the use of systemic chemotherapy (Figure 2). Chemotherapy may be used in an attempt to downsize liver metastases to a point where they become resectable or ablatable (Clark & Smith 2014; Delaunoy et al. 2005). In patients with metastases that will never be resectable or ablatable, the goal of chemotherapy is to slow progression of disease. Depending on the response to chemotherapy, patients may receive one or more lines of therapy. The proposed use of SIRT (SIR-Spheres, highlighted in the red boxes below) provides an additional treatment option to be used in conjunction with systemic chemotherapy. The proposed use of SIRT may be at any line of therapy; however, SIRT is generally only used once. SIRT may also be used as a monotherapy, especially for patients with CRC metastases that are refractory to chemotherapy.



**Figure 2 Current and proposed clinical pathway for treatment of hepatic metastases secondary to CRC**

Source: adapted from page 96 of Assessment Report for MSAC Application 1082

The proposed addition of SIRT to the current algorithm is shown in the red boxes.

#### 4. Proposed economic evaluation

The applicant predicts a claim of superiority for both comparative effectiveness and comparative safety in patients treated with SIRT using Y-90 resin microspheres. *On the basis of these claims, the appropriate type of economic evaluation would be either a cost-effectiveness or a cost-utility analysis. However, direct comparative evidence, such as that obtained from RCTs is probably not available. Additional evidence will need to be presented in order to substantiate these claims.*

The *Technical Guidelines for preparing assessment reports for the Medical Services Advisory Committee*<sup>3</sup> outline how to structure the decision analytic model underpinning the proposed economic evaluation, which is informed by the final structure of the PICO agreed to by PASC.

## 5. Proposed item descriptor

SIR-Spheres® Y-90 resin microspheres are included on the Prostheses list under billing code SE001.

SIR-Spheres is classified as an active implantable medical device by the Therapeutic Goods Administration and is listed on the ARTG (registration number 149332). It is approved for the treatment of malignant liver tumours of primary or secondary origin that are not suitable for resection or ablation.

The current MBS item descriptors are shown in Table 2. It is proposed to amend the item descriptors as marked below to reflect the current chemotherapy regimen used to treat liver metastases secondary to CRC.

**Table 2 Item descriptors for the proposed new MBS service**

Category 3 – THERAPEUTIC PROCEDURES		
MBS item number 35404	Group Subgroup Subheading	T8 - SURGICAL OPERATIONS 3 - VASCULAR 13 - INTERVENTIONAL
<p>DOSIMETRY, HANDLING AND INJECTION OF SIR-SPHERES for selective internal radiation therapy of hepatic metastases which are secondary to colorectal cancer and are not suitable for resection or ablation, used in combination with <b>guideline-directed</b> systemic chemotherapy, not being a service to which item 35317, 35319, 35320 or 35321 applies</p> <p>The procedure must be performed by a specialist or consultant physician recognised in the specialties of nuclear medicine or radiation oncology on an admitted patient in a hospital. To be claimed once in the patient's lifetime only.</p> <p>Multiple Services Rule T8.2</p> <p>(Anaes.) (Assist.)</p> <p>MBS Fee: \$346.60 Benefit: 75% = \$259.95</p>		
MBS item number 35406	Group Subgroup Subheading	T8 - SURGICAL OPERATIONS 3 - VASCULAR 13 - INTERVENTIONAL
<p>Trans-femoral catheterisation of the hepatic artery to administer SIR-Spheres to embolise the microvasculature of hepatic metastases which are secondary to colorectal cancer and are not suitable for resection or ablation, for selective internal radiation therapy used in combination with <b>guideline-directed</b> systemic chemotherapy, not being a service to which item 35317, 35319, 35320 or 35321 applies excluding associated radiological services or preparation, and excluding aftercare</p> <p>Multiple Services Rule T8.2</p> <p>(Anaes.) (Assist.)</p> <p>MBS Fee: \$813.30 Benefit: 75% = \$610.00</p>		

<sup>3</sup> Available from URL: <http://www.msac.gov.au/internet/msac/publishing.nsf/Content/assessment-groups> accessed 27 February 2017.

Category 3 – THERAPEUTIC PROCEDURES		
MBS item number 35408	Group	T8 - SURGICAL OPERATIONS
	Subgroup	3 - VASCULAR
	Subheading	13 - INTERVENTIONAL
Catheterisation of the hepatic artery via a permanently implanted hepatic artery port to administer SIR-Spheres to embolise the microvasculature of hepatic metastases which are secondary to colorectal cancer and are not suitable for resection or ablation, for selective internal radiation therapy used in combination with <b>guideline-directed</b> systemic chemotherapy, not being a service to which item 35317, 35319, 35320 or 35321 applies excluding associated radiological services or preparation, and excluding aftercare		
Multiple Services Rule T8.2		
(Anaes.) (Assist.)		
MBS Fee: \$610.10 Benefit: 75% = \$457.60		

*Item 35408 is proposed for removal from the MBS, as it is now obsolete.*

Preparation or “work-up” of a patient would be carried out in an outpatient setting. The implantation of SIR-Spheres® Y-90 resin microspheres would be carried out in an inpatient setting in both private and public hospitals.

Patients would need to have a referral from an oncologist to the interventional radiologist. The service must be performed by a specialist or consultant physician recognised in the specialties of nuclear medicine or radiation oncology. The company producing SIR-Spheres® (Sirtex) provides a training programme for institutions or new users that want to start or re-start a SIR-Spheres Y-90 resin microspheres service.

The applicant has indicated that the proposed service would only be used once per lifetime. However, as discussed in section 2.3, there are concerns that the SIRT may be subject to leakage (i.e. more than one procedure may be performed and claimed per individual).

## 6. References

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## Appendix 1

### Measuring objective response rate using the Modified Response Evaluation Criteria in Solid Tumours (mRECIST) and European Association for Study of the Liver (EASL) Criteria

Response category	EASL criteria <sup>a</sup>	mRECIST criteria <sup>b</sup>
Complete response	Disappearance of enhancing tissue in target lesion(s)	Disappearance of intratumoural arterial enhancement and pathologic lymph nodes
Partial response	≥50% decrease in the sum of the arterial enhancing areas	≥30% decrease in the sum of the diameters of viable tissue, taking as reference baseline sum of the diameters
Stable disease	Neither partial response nor progressive disease	Neither partial response nor progressive disease
Progressive disease	≥25% increase in the sum of the arterial enhancing area or appearance of new lesion(s)	≥20% increase in the sum of the diameters of viable tissue, recorded since treatment started

Source: Gonzalez-Guindalini et al. (2013), Kudo et al. (2010)

<sup>a</sup> Arterial enhancing area = longest diameter multiplied by longest perpendicular diameter in the enhancing tumour

<sup>b</sup> Viable tissue = arterial enhanced part of the lesion