The following summarises the key data supporting the use of SIR-Spheres Y-90 resin microspheres in the treatment of liver metastases from pancreatic tumours:

<table>
<thead>
<tr>
<th>Lead Author</th>
<th>n</th>
<th>Treatment</th>
<th>ORR</th>
<th>SD</th>
<th>Median PFS or TTP</th>
<th>Median Survival</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>First-Line to Treatment-Refractory Disease</strong></td>
<td></td>
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</tr>
<tr>
<td>Gibbs¹</td>
<td>14</td>
<td>SIR-Spheres¹ + 5FU</td>
<td>21.0%</td>
<td>71.0%</td>
<td>4.4 months¹</td>
<td>5.2 months¹</td>
</tr>
<tr>
<td>Gulec²</td>
<td>11</td>
<td>SIR-Spheres¹ + 5FU ± SERT</td>
<td>nr</td>
<td>nr</td>
<td>nr</td>
<td>nr</td>
</tr>
<tr>
<td>Michl³</td>
<td>19</td>
<td>SIR-Spheres¹</td>
<td>47.0%</td>
<td>47.0%</td>
<td>2.6 months</td>
<td>3.4 months</td>
</tr>
<tr>
<td><strong>Treatment-Refractory Disease</strong></td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Cao⁴</td>
<td>5</td>
<td>SIR-Spheres¹</td>
<td>40.0%</td>
<td>20.0%</td>
<td>nr</td>
<td>nr</td>
</tr>
<tr>
<td>Lo⁵</td>
<td>8</td>
<td>SIR-Spheres¹</td>
<td>nr</td>
<td>nr</td>
<td>6.4 months</td>
<td>nr</td>
</tr>
<tr>
<td>Kim⁶</td>
<td>8</td>
<td>SIR-Spheres¹</td>
<td>12.5%</td>
<td>37.5%</td>
<td>3.4 months</td>
<td>3.8 months</td>
</tr>
</tbody>
</table>

Key: ORR: objective response rate (complete response + partial response); SD: stable disease; PFS: progression free survival; TTP: Time to Progression; *TTP or PFS in the liver; †: SIR-Spheres Y-90 resin microspheres; nr: not reported; SERT: selective external radiotherapy; ‡: retrospective study; §: ORR in the liver

Prospective phase II study of radioembolisation and systemic chemotherapy in patients with liver metastases from primary cancer of the pancreas

A prospective study of 14 patients (median age 62 years), with unresectable liver metastases from pancreatic cancer treated with the combination of SIR-Spheres Y-90 resin microspheres and 5FU revealed:

- 10 patients had WHO performance status 0, six patients had extra-hepatic disease, 10 had the primary cancer in situ, three patients had received prior therapy (two gemcitabine, two 5FU, one carboplatin). The tumour burden varied between 1% and 37% of the liver volume with bilobar involvement in all patients;
- best response in the liver was partial response in three patients (21%), stable disease in 10 (71%) and progressive disease in one patient (8%);
- median PFS in the liver was 5.2 months, while median PFS at any site was 4.4 months;
- median overall survival was 5.5 months for the entire cohort; 6.6 months for patients with liver-only metastases, 13.6 months for patients with resected primary, and 4.2 months for patients with the primary tumour in situ;
- grade 3/4 adverse events occurred in eight (57%) patients during the first 60 days, including fatigue in two (14%), thrombocytopenia in two (14%) and neutropenia in two (14%) patients. Death without documented progression occurred in two patients, one sudden death after 1.5 months and a possible treatment-related liver failure 7.0 months after SIRT;
- the authors concluded that the combination of radioembolisation and 5FU appears effective in controlling metastases from pancreatic cancer, with extra-hepatic progression and resection of the primary tumour dictating survival in the majority of this cohort. Significant toxicity was observed and the safety of this approach needs to be confirmed in subsequent studies.

Prospective phase II study of SIR-Spheres Y-90 resin microspheres in combination with 5FU chemotherapy ± selective external radiation

This pilot phase II study reported the tumour response and safety outcomes from combining SIR-Spheres Y-90 resin microspheres (SIRT) with 5FU chemotherapy in patients with pancreatic liver metastases, plus selective external radiation (SERT) in patients with pancreatic bed disease.

- seven patients had both liver and pancreatic bed disease and received the complete chemotherapy-SIRT-SERT and four patients received chemotherapy-SIRT for liver-only disease. Lobar SIRT was administered in four patients, with a whole-liver approach in seven patients;
- all patients underwent a pancreatic fluorine-18 (¹⁸F) fluorodeoxyglucose FDG-PET-CT evaluation prior to and following treatment. Two patients expired before the 4-week follow-up assessment owing to pulmonary embolism and were excluded from objective response analysis;
- in terms of tumour objective response to chemotherapy-SIRT, seven of the nine patients demonstrated a decrease in standard uptake value (SUVavg) (range 7–33%). Six patients showed a decrease in functional tumour volume (FTV) (range 70–100%). An objective response was demonstrated as a decrease in total lesion glycolysis (TLG), a composite index of functional change, in six patients (range 81–100%). No concomitant changes were noted in anatomic tumour volume (ATV);
- in terms of tumour objective response to chemotherapy-SERT, six of the seven patients demonstrated a decrease in SUVavg (range 7–41%). Five patients showed a decrease in FTV (range 18–68%) and an objective response was demonstrated as a decrease in TLG in six patients (range 44–73%). No concomitant changes were noted in ATV;
- in terms of CA 19-9 changes, six of the nine patients (67%) demonstrated an objective tumour marker response with a 6–87% decrease in pretreatment CA 19-9 levels within four to six weeks;
Retrospective study of SIR-Spheres Y-90 resin microspheres in patients with liver metastases from pancreatic cancer

A single-centre retrospective study of patients with metastatic pancreatic cancer who failed chemotherapy revealed:  
- eight patients (three females, five males; mean age, 65.0 years) with pancreatic adenocarcinoma underwent a total of nine SIRT procedures;  
- all patients failed chemotherapy; at the time of treatment, 6/8 patients had bilobar metastasis;  
- the 30-day mortality rate was 0%, and no significant major complications were reported. There was no significant difference in the pre-procedure and 3-month serum total bilirubin levels ($P > 0.05$).  
- median survival after SIR-Spheres Y-90 resin microspheres was 6.4 months; four of eight patients (50%) were alive at six months after SIRT, and the authors concluded that SIR-Spheres Y-90 resin microspheres are safe as salvage therapy for metastatic pancreatic cancer and have a modest survival benefit compared to reported historical survival time for second-line chemotherapy regimen.  

References