xSPECT Quant
best of image gallery

xSPECT Quant is not commercially available in all countries. Due to regulatory reasons, its future availability cannot be guaranteed. Please contact your local Siemens organization for further details.
$^{123}$I xSPECT Quant

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**123I xSPECT Quant enables standardized quantification for appropriate diagnosis in equivocal motion disorders**

<table>
<thead>
<tr>
<th>Patient SUV$_{\text{max}}$</th>
<th>Right</th>
<th>Left</th>
</tr>
</thead>
<tbody>
<tr>
<td>Caudate</td>
<td>9.4</td>
<td>10.4</td>
</tr>
<tr>
<td>Putamen</td>
<td>9.1</td>
<td>9.2</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Patient SUV$_{\text{max}}$</th>
<th>Right</th>
<th>Left</th>
</tr>
</thead>
<tbody>
<tr>
<td>Caudate</td>
<td>8.1</td>
<td>7.8</td>
</tr>
<tr>
<td>Putamen</td>
<td>4.2</td>
<td>4.1</td>
</tr>
</tbody>
</table>

Iodine 123 Ioflupane

Normal 123I Ioflupane

Pathological 123I Ioflupane

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Data courtesy of Centre Hospitalier Universitaire Vaudois, Lausanne, Switzerland.
123I xSPECT Quant enables standardized quantification for appropriate diagnosis in equivocal motion disorders

Clinical details
A patient with an unclear tremor was referred for a Symbia Intevo™ 123I xSPECT Quant™ SPECT/CT study. The two studies compared normal and pathological tracer uptake in the caudate and putamen. The first patient does not demonstrate disease-specific changes for Morbus Parkinson and additional diagnostic evaluation is needed. The second patient shows typical decrease of the dopaminergic metabolism with high probability of Morbus Parkinson. In addition to the visual read, xSPECT Quant using 123I in DaTscan™ enables standardized quantification assessment.

Examination protocol
Symbia Intevo 16, normal 5.3 mCi (180 MBq), 123I-Ioflupane, pathological 4.8 mCi (177 MBq), 123I-Ioflupane, 4-hour post-injection delay; 15 minute SPECT acquisition. Images reconstructed with xSPECT Quant, 256 x 256 matrix size. CT normal DLP 35 mGy, 12 mAs, 110 kV, CT pathological DLP 38 mGy, 12 mAs, 110 kV.

<table>
<thead>
<tr>
<th></th>
<th>Normal Caudate</th>
<th>Normal Putamen</th>
<th>Pathological Caudate</th>
<th>Pathological Putamen</th>
</tr>
</thead>
<tbody>
<tr>
<td>SUV max</td>
<td>8.1</td>
<td>4.2</td>
<td>7.8</td>
<td>4.1</td>
</tr>
</tbody>
</table>

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Data courtesy of Centre Hospitalier Universitaire Vaudois, Lausanne, Switzerland.
\[ ^{111}\text{In} \] xSPECT Quant

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Evaluation of neuroendocrine tumor

\textsuperscript{111}In xSPECT Quant enables standardized quantification

\begin{align*}
\text{SUV}_{\text{max}} & = 18.9 \\
\text{SUV}_{\text{max}} & = 11.4 \\
\text{SUV}_{\text{max}} & = 12.1 \\
\text{SUV}_{\text{max}} & = 12.8 \\
\text{SUV}_{\text{max}} & = 5.8 \\
\text{SUV}_{\text{max}} & = 7.2
\end{align*}

2 hours post injection

24 hours post injection

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Data courtesy of Centre Hospitalier Universitaire Vaudois, Lausanne, Switzerland.
Evaluation of neuroendocrine tumor

$^{111}$In xSPECT Quant enables standardized quantification

2 hours post injection

24 hours post injection

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Data courtesy of Centre Hospitalier Universitaire Vaudois, Lausanne, Switzerland.
Evaluation of neuroendocrine tumor

$^{111}$In xSPECT Quant enables standardized quantification

Clinical details
A patient with a neuroendocrine tumor of the pancreas was referred for a Symbia Intevo™ SPECT/CT $^{111}$In xSPECT Quant™ study. The initial SPECT/CT study shows multiple tracer-avid liver metastases. Bilateral renal and splenic uptake appear normal. Delayed study performed after 24 hours shows persistent levels of tracer concentration within functioning liver metastases with considerable clearance of tracer from kidneys. Substantial bowel activity is also visualized. Evaluation of SUV changes within liver metastases shows partial decrease in tracer concentration. The dual time point study demonstrates persistent tracer retention in metastatic lesions with normal renal clearance, suggesting possibility of adequate response to radionuclide therapy.

Examination protocol
Symbia Intevo 16 SPECT/CT, 4.6 mCi (172 MBq) $^{111}$In-Octreoscan, 2- and 24-hour post-injection delay; 15 minute SPECT acquisition. Images reconstructed with $^{111}$In xSPECT Quant, 256 x 256 matrix size.

xSPECT Quant is not commercially available in all countries. Due to regulatory reasons, its future availability cannot be guaranteed. Please contact your local Siemens organization for further details.

Data courtesy of Centre Hospitalier Universitaire Vaudois, Lausanne, Switzerland.

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177Lu xSPECT Quant

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Sequential xSPECT Quant study following first therapy cycle of 7.7 GBq of $^{177}$Lu DOTATATE

4 hours post injection

24 hours post injection

120 hours post injection

Therapy cycle 1: 7.7 GBq

xSPECT Quant is not commercially available in all countries. Due to regulatory reasons, its future availability cannot be guaranteed. Please contact your local Siemens organization for further details.

Data courtesy of Royal North Shore Hospital, Sydney, Australia.
Tumor and renal dosimetry from sequential xSPECT Quant study using Dosimetry Research Tool\[a\] following first therapy

<table>
<thead>
<tr>
<th>Region</th>
<th>Dose (Gy)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Liver</td>
<td>1.88</td>
</tr>
<tr>
<td>Left kidney</td>
<td>3.51</td>
</tr>
<tr>
<td>Right kidney</td>
<td>3.48</td>
</tr>
<tr>
<td>Lesion 1</td>
<td>15.02</td>
</tr>
</tbody>
</table>

Therapy cycle 1 administered dose: 7.7 GBq

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\[a\] The Dosimetry Research Tool is an investigational device. Limited by Federal (or United States) law to investigational use. This device is exclusively for clinical investigations. This investigational device does not fulfill all the essential requirements according to the European Medical Device Directive (93/42/EEC) and its national implementations. It is not commercially available in the European Union, or other countries worldwide.

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Data courtesy of Royal North Shore Hospital, Sydney, Australia.
Sequential xSPECT Quant study following second cycle of 7.4 GBq of $^{177}$Lu DOTATATE therapy in a patient with liver metastases

Therapy cycle 2 administered dose: 7.4 GBq

Absorbed dose map with Dosimetry Research Tool

4.43 Gy mean
4.84 Gy mean
4.3 Gy mean

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Data courtesy of Royal North Shore Hospital, Sydney, Australia.
Sequential xSPECT Quant study following third cycle of 7.7 GBq of $^{177}$Lu DOTATATE therapy in a patient with liver metastases

0.5 hours post injection

4 hours post injection

24 hours post injection

120 hours post injection

Therapy cycle 3 administered dose: 7.7 GBq

Absorbed dose map with Dosimetry Research Tool\[a\]

4.3 Gy mean

3.84 Gy mean

2.8 Gy mean

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Data courtesy of Royal North Shore Hospital, Sydney, Australia.
Sequential xSPECT Quant study following fourth cycle of 7.05 GBq of $^{177}$Lu DOTATATE therapy in a patient with liver metastases

Therapy cycle 4 administered dose: 7.05 GBq

0.5 hours post injection  
4 hours post injection  
24 hours post injection  
120 hours post injection

4.18 Gy mean  
3.04 Gy mean  
2.1 Gy mean

Absorbed dose map with Dosimetry Research Tool[1]

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Data courtesy of Royal North Shore Hospital, Sydney, Australia.
Tumor and renal absorbed dose after 4 sequential therapy cycles of $^{177}$Lu DOTATATE

Absorbed dose

- Cycle 1 – May 2017
  - 10.1 Gy
  - 3.51 Gy
  - 7.7 GBq

- Cycle 2 – July 2017
  - 4.3 Gy
  - 4.84 Gy
  - 7.4 GBq

- Cycle 3 – Oct 2017
  - 2.8 Gy
  - 3.84 Gy
  - 7.7 GBq

- Cycle 4 – Dec 2017
  - 2.1 Gy
  - 3.04 Gy
  - 7.05 GBq

Cumulative dose to the left kidney: mean 15.3 Gy
Cumulative dose to the right kidney: mean 16.18 Gy

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Data courtesy of Royal North Shore Hospital, Sydney, Australia.
## Tumor and renal absorbed dose after 4 sequential therapy cycles of $^{177}$Lu DOTATATE

<table>
<thead>
<tr>
<th>Cycle</th>
<th>Date</th>
<th>Therapy</th>
<th>Absorbed dose Left Kidney</th>
<th>Absorbed dose Right Kidney</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>May 2017</td>
<td>7.7 GBq</td>
<td>10.1 Gy</td>
<td>3.51 Gy</td>
</tr>
<tr>
<td>2</td>
<td>July 2017</td>
<td>7.4 GBq</td>
<td>4.3 Gy</td>
<td>4.84 Gy</td>
</tr>
<tr>
<td>3</td>
<td>Oct 2017</td>
<td>7.7 GBq</td>
<td>3.84 Gy</td>
<td>3.04 Gy</td>
</tr>
<tr>
<td>4</td>
<td>Dec 2017</td>
<td>7.05 GBq</td>
<td>3.04 Gy</td>
<td>2.1 Gy</td>
</tr>
</tbody>
</table>

### Clinical details

A patient with a metastatic neuroendocrine tumor with multiple, large, functioning liver lesions was treated with 4 cycles of $^{177}$Lu DOTATATE of approximately 7.4 GBq, repeated at 8-12 week intervals. Sequential SPECT/CT with xSPECT Quant™ was performed at 0.5, 4, 24, and 120 hours following each therapy administration in order to assess renal and tumor absorbed dose. Tumor dosimetry was performed on Siemens Healthineers’ Dosimetry Research Tool\([a]\) (DRT) providing 3D voxel-based absorbed dose maps. Sequential xSPECT Quant following initial therapy shows initial high concentration of tracer in renal cortex and medulla with a fast washout. Metastatic lesions show gradual increase in tracer concentration between 5 hours to 24 hours with subsequent slow washout. The images from subsequent cycles show gradual and progressive decrease in size and uptake in the liver metastases. Renal cortex shows gradually increasing uptake following therapy administration but with fast washout. Dosimetry calculations show renal absorbed dose within normal limits in each cycle with slight increase in the second cycle with cumulative renal dose approximately 16 Gy, which was lower than 23 Gy threshold. Tumor dose varied significantly with the largest tumor receiving 15 Gy following the first therapy but with decreasing dose in the subsequent therapies, which was associated with significant response of tumor with shrinkage as well as significant reduction in uptake, suggesting positive response to radionuclide therapy.

### Examination protocol

Symbia Intevo™ 6, 200 mCi (7.4 GBq) $^{177}$Lu DOTATATE, 0.5, 4, 24, and 120-hour post-injection study

CT: 130 kV, 45 eff mAs. 6 x 1.0 mm collimation, SPECT: 60 stops per detector, 20 sec/stop.

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Data courtesy of Royal North Shore Hospital, Sydney, Australia.
$^{99m}$Tc xSPECT Quant

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xSPECT Bone and $^{99m}$Tc-MDP xSPECT Quant demonstrate response to androgen receptor antagonists in bone metastases

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Data courtesy of Dana Farber Cancer Institute, Boston, MA, USA.
xSPECT Bone and \textsuperscript{99m}Tc-MDP xSPECT Quant demonstrate response to androgen receptor antagonists in bone metastases

\begin{figure}
\centering
\includegraphics[width=\textwidth]{chart.png}
\caption{xSPECT Bone\textsuperscript{TM} and xSPECT Quant\textsuperscript{TM} MIP}
\end{figure}

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Data courtesy of Dana Farber Cancer Institute, Boston, MA, USA.
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Data courtesy of Dana Farber Cancer Institute, Boston, MA, USA.
xSPECT Bone and $^{99m}$Tc-MDP xSPECT Quant demonstrate response to androgen receptor antagonists in bone metastases

Clinical details

A 70-year-old man with metastatic castration-resistant prostate cancer treated with androgen receptor antagonist enzalutamide. The patient underwent $^{99m}$Tc-MDP bone SPECT/CT using xSPECT Bone™ and xSPECT Quant™ at 12, 24, and 36 weeks after beginning treatment. Intensely hypermetabolic metastases in L2, L3, and T8 vertebrae and left ileum were visualized in the initial study. There is a visual decrease in intensity of uptake in the lesions in T8 vertebral body after 24 weeks of therapy with normalization of uptake after 36 weeks, which is also reflected in SUV$_{\text{max}}$ values. L2, L3, and iliac metastases show only minor decrease in intensity of uptake at 24 weeks with a slightly greater decrease at 36 weeks. The SUV$_{\text{max}}$ values from $^{99m}$Tc xSPECT Quant show more than a 60% decrease after 36 weeks of therapy. The CT shows resolution of sclerosis of T8 vertebral body and increased lysis in L2 vertebral body reflecting positive therapy response.

Sequential SUV$_{\text{max}}$ decrease correlated with PSA, which declined from 17 to 0.8 ng/ml at 24 weeks and fell further to 0.4 ng/ml at 36 weeks, suggesting the therapeutic approach was effective.

Examination protocol

Symbia Intevo™ 16, 24 mCi (899 MBq) $^{99m}$Tc-MDP, 3-hour post-injection delay.

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Data courtesy of Dana Farber Cancer Institute, Boston, MA, USA.
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