99mTc -HMPAO SPECT co-registered to MRI in children candidate for epilepsy surgery.

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Disclosure Slide

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Rigshospitaletet

Population 5,7 mill
4 neurosurgical departments
60 consultants
1 epilepsy surgery center
2 consultants in epilepsy surgery
Epilepsy Surgery in Denmark 2016

App. 100 pt. investigated per year
30 pt. have surgery
25 % are children

Video EEG monitoring: All patients
MRI: All patients
Ictal SPECT: 40 %
Inter Cranial Registration: 40 %
International standardized protocol

- Pre-surgical evaluation for epilepsy surgery – European Standards
  European Journal of Neurology 7, 119-22, 2000
- Revised protocol for Resective Epilepsy Surgery 2011
- www.epilepsiselskabet.dk
Ictal SPECT is the only imaging modality that is able to visualize the ictal onset zone in routine clinical practice.
History / method

Interictal → Ictal → Hyper-hypo → SISCOM
SISCOM

SPECT images with subsequent co-registration with MRI

Interiktal

Iktal
Case: Extra Temporal Foci
## Background

### Sensitivity of SPECT

<table>
<thead>
<tr>
<th>Mode</th>
<th>Interictal</th>
<th>Ictal</th>
<th>Hypo-hyper</th>
<th>SISCOM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temporal Sensitivity</td>
<td>30-90%</td>
<td>75-97%</td>
<td>75-95%</td>
<td>95%</td>
</tr>
<tr>
<td>Extra Temporal Sensitivity</td>
<td>unavailable</td>
<td>40-50%</td>
<td>40-50%</td>
<td>88%</td>
</tr>
</tbody>
</table>
Method

2009-2015

Children enrolled
n=50

Ictal SPECT
completed
n=42

Surgery
n=15

SISCOM positiv
n=9

No SISCOM (only ictal SPECT) positiv
n=2

SISCOM negativ
n=4

No surgery
n=25

SISCOM positiv
n=13

SISCOM negativ
n=12

Ictal SPECT Incomplete
N = 8

Technically insufisien SPECT
n=2

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Engel classification = Golden standard

- Class I: Free of disabling seizures
- Class II: Rare disabling seizures ("almost seizure-free")
- Class III: Worthwhile improvement
- Class IV: No worthwhile improvement
### 2 x 2 tables

<table>
<thead>
<tr>
<th></th>
<th>Favorable outcome</th>
<th>Poor outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Engel I – II</td>
<td>Engel III-IV</td>
</tr>
<tr>
<td>SISCOM positive</td>
<td>6</td>
<td>2</td>
</tr>
<tr>
<td>SISCOM negative</td>
<td>2</td>
<td>2</td>
</tr>
</tbody>
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<tr>
<td>Ictal positive</td>
<td>7</td>
<td>2</td>
</tr>
<tr>
<td>Ictal negative</td>
<td>1</td>
<td>4</td>
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</table>
## Results

<table>
<thead>
<tr>
<th></th>
<th>Sensitivity</th>
<th>Specificity</th>
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</thead>
<tbody>
<tr>
<td>SISCOM</td>
<td>75 %</td>
<td>50 %</td>
</tr>
<tr>
<td>Ictal SPECT</td>
<td>87 %</td>
<td>66 %</td>
</tr>
</tbody>
</table>
Conclusions

• Compared to adults SISCOM does not seem to add extra value to the traditional Ictal image.

• Very few data are available in children and more data are needed.