Carcinoid Tumours and Carcinoid Syndrome
- What we know
- What we don’t know

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Endocrine Surgeon & Surgical Oncologist
St. Vincent’s Hospital, Sydney

Unicorn Foundation Patient Support Meeting
North Shore Private Hospital
St Leonards, NSW  14th April 2010
Dr Janice Pasieka
Neuroendocrine Tumour Clinic
University of Calgary

• 15 years
• Multidisciplinary
  – Endocrinologist – Dr Otto Rorstad
  – Endocrine Surgeon – Dr Janice Pasieka
  – Hepatobiliary Surgeon – Dr Elijah Dixon
  – Nuclear Medicine Physician – Dr Ernst Postema
  – Clinical Geneticist – Dr Michael Innes
• Referral center for Western Canada
Gastrointestinal NET

• Tumours derived from Enterochromaffin Cells (EC cells)
• Most common sites
  – Small intestine
  – Appendix
  – Colon & Rectum
Enterochromaffin (EC) cells
Enterochromaffin (EC) cells
Enterochromaffin (EC) cells

**Serotonin (5-HT)**
- ↑ blood flow
- ↑ secretions
- ↑ peristalsis

Metabolized & inactivated by liver

Measure in urine – 5HIAA
Enterochromaffin (EC) cells

- Serotonin (5-HT)
- Melatonin
- Substance P
- Guanylin
- Histamine
- Bradykinin
- Chromogranin
- Growth factors
Intestinal contents
Adjacent nerves

Somatostatin
- (octreotide, lanreotide, LAR)
Primary Tumours

Mesenteric Lymph nodes
Primary Tumours

Mesenteric Lymph nodes

Liver Metastases

Primary Tumours
Carcinoid Syndrome

- Flushing of skin
- Diarrhoea
- Bronchospasm / wheezing

- Heart valve fibrosis
  - Tricuspid and pulmonary valves
Carcinoid Syndrome

• Tests
  – 24 hr urine 5-HIAA
  – Serum Chromogranin-A

• Medical treatment
  – Octreotide / lanreotide / LAR
Research study - Calgary

• Patients with Carcinoid Syndrome
  – ‘not themselves’
  – ‘difficulty remembering things’
  – ‘not as on the ball as they used to be’
  – ‘finding work difficult’
  • ? symptoms of cognitive difficulties
Research study - Calgary

- 21 patients – all small intestine NET with liver metastases & carcinoid syndrome
- Cognitive symptom questionnaire
- Formal neurocognitive testing by psychologist
### Symptom Assessment

- 38-Question standardized Multiple Ability Self-reporting Questionnaire (MASQ)

<table>
<thead>
<tr>
<th>Cognitive Domain</th>
<th>Symptom score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Language</td>
<td>1 – 5</td>
</tr>
<tr>
<td>Attention / Concentration</td>
<td>1 – 5</td>
</tr>
<tr>
<td>Visual-Perceptual function</td>
<td>1 – 5</td>
</tr>
<tr>
<td>Visual memory</td>
<td>1 – 5</td>
</tr>
<tr>
<td>Verbal memory</td>
<td>1 – 5</td>
</tr>
</tbody>
</table>

Asymptomatic: 1 → 5 Most severe symptoms
## MASQ Symptom scores

<table>
<thead>
<tr>
<th>Cognitive Domain</th>
<th>Score ± s.d. (1 - 5)</th>
<th>Healthy norms</th>
</tr>
</thead>
<tbody>
<tr>
<td>Verbal memory</td>
<td>2.75 ± 0.5</td>
<td>&lt;2.1</td>
</tr>
<tr>
<td>Attention / Concentration</td>
<td>2.41 ± 0.7</td>
<td>&lt;2.0</td>
</tr>
<tr>
<td>Language skills</td>
<td>2.31 ± 0.6</td>
<td>&lt;1.8</td>
</tr>
<tr>
<td>Visual memory</td>
<td>2.30 ± 0.7</td>
<td>&lt;1.8</td>
</tr>
<tr>
<td>Visual-Perceptual function</td>
<td>2.17 ± 0.6</td>
<td>&lt;2.0</td>
</tr>
</tbody>
</table>
## Cognitive Testing

- Formal assessment - Neuropsychologist
- Battery of 6 standardized cognitive tests

<table>
<thead>
<tr>
<th>Cognitive Domain</th>
<th>Test</th>
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<tbody>
<tr>
<td>Attention / Concentration</td>
<td>- Trail making test</td>
</tr>
<tr>
<td></td>
<td>- Verbal series attention</td>
</tr>
<tr>
<td>Execute skills / function</td>
<td>Wisconsin card sorting</td>
</tr>
<tr>
<td>Visual-Perceptual function</td>
<td>Complex figure recall</td>
</tr>
<tr>
<td>Language</td>
<td>Word &amp; category fluency</td>
</tr>
<tr>
<td>Visual memory</td>
<td>Complex figure recall</td>
</tr>
<tr>
<td>Verbal memory</td>
<td>Selective reminding</td>
</tr>
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<td>Cognitive Domain</td>
<td>Symptom Scores</td>
</tr>
<tr>
<td>-------------------------------</td>
<td>----------------</td>
</tr>
<tr>
<td>Attention/Concentration</td>
<td>↑</td>
</tr>
<tr>
<td>Language skills</td>
<td>↑</td>
</tr>
<tr>
<td>Verbal memory</td>
<td></td>
</tr>
<tr>
<td>- Immediate recall</td>
<td>↑</td>
</tr>
<tr>
<td>- Delayed recall</td>
<td>↑</td>
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<tr>
<td>Visual-Percept Function</td>
<td></td>
</tr>
<tr>
<td>Visual memory</td>
<td>↑</td>
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Blood Brain Barrier

Tph2 \[\rightarrow\] 5-HT

Brain

5-HTT

5-HT

Intestine

Wnts

LRPs

Platelets

Liver

Blood Brain Barrier

Enterochromaffin

? Cause

-Serotonin?

-Another tumour substance?

-treatment?

-malignancy?

-tryptophan depletion?
Carcinoid Syndrome

• Our understanding of Carcinoid Syndrome is slowly improving

• Need for more research to more fully understand effects

• Plan for future research at St. Vincent’s Hospital, Garvan Institute & University of Calgary