Latest Advances in the Neurointerventional Treatment of Ischemic Stroke
Neurointerventional Management of Ischemic Stroke

1. Thrombectomy for acute ischemic stroke
2. Carotid artery stenting
3. Management of vertebrobasilar disease
4. The latest in management of intracranial atherosclerosis disease (ICAD)
Thrombectomy

Revolution in Stroke Care

NNT to reduce disability is 2.5

One of the most effective therapies in medicine

Only available at highly specialized centers
We have **8 positive trials** of thrombectomy in the <6 hour window

<table>
<thead>
<tr>
<th></th>
<th>% TPA</th>
<th>Enrolled up to:</th>
<th>% ≤2 Int vs. cont</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>MR CLEAN</td>
<td>87 vs 90%</td>
<td>6hrs</td>
<td>33 vs 19%</td>
<td>Did not use ASPECTS for enrollment</td>
</tr>
<tr>
<td>EXTEND-IA</td>
<td>100%</td>
<td>tissue not time</td>
<td>71 vs 40%</td>
<td></td>
</tr>
<tr>
<td>ESCAPE</td>
<td>73 vs 79%</td>
<td>Up to 12 hrs (only</td>
<td>51 vs 29%</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>16% &gt;6hr)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SWIFT-PRIME</td>
<td>100%</td>
<td>Up to 6 hrs</td>
<td>60 vs 35%</td>
<td></td>
</tr>
<tr>
<td>REVASCAT</td>
<td>70 vs 80%</td>
<td>8hrs</td>
<td>44 vs 28%</td>
<td>Waiting for TPA to fail</td>
</tr>
<tr>
<td>THRACE</td>
<td>100%</td>
<td>IR started &lt;5 finished &lt;6</td>
<td>54 vs 42%</td>
<td></td>
</tr>
<tr>
<td>THERAPY</td>
<td>100%</td>
<td>Enrolled &lt;4.5 hrs</td>
<td>38 vs 30%</td>
<td>Used Penumbra Adapt rather than stentriever</td>
</tr>
<tr>
<td>PISTE</td>
<td>100%</td>
<td>6 hrs</td>
<td>Terminated early</td>
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The DAWN Trial was just presented at European Stroke Organisation Conference in May 2017.

Approach applies advanced perfusion imaging to select patients who could benefit from thrombectomy in the late 6-24 hour window.

Now represents the most positive thrombectomy trial to date with a NNT of only 2 to reduce disability.
74 year old high functioning CPA who woke up with symptoms concerning for stroke. He had rightward gaze deviation, left face/arm/leg weakness, sensory loss, hemineglect, and visual field cut. 

NIHSS was 20
Case 1 - St John’s wake up stroke

CT Perfusion showed small core infarct (dead brain) and large penumbra (at risk brain)
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Tandem Lesions
Tandem Lesions

Right Internal Carotid

Right Middle Cerebral
Tandem Lesions

Here our microwire and microcatheter are going up the left internal carotid artery, over the Anterior Communicating artery, and down the right occluded cervical carotid artery.
Tandem Lesions

A. Our wire from above shows us where to go to open the right carotid

B. After stenting the carotid we have an easy path to treat the MCA occlusion
Tandem Lesions

A. Injection shows occlusion at the carotid terminus

B. After thrombectomy, the MCA fully reperfused and filling anterograde
MRI shows much smaller area of stroke than the at risk territory

Patient recovered to NIHSS of 3 immediately after the case
Discharged to Acute Rehab after just 4 days and now back to his pre-stroke baseline.
Carotid Artery Stenting

With modern techniques in carotid artery stenting, the latest trials shows stenting and CEA to be equal and very effective therapies for treating carotid artery stenosis

- Brott et al, NEJM 2010
- Rosenfield K et al, NEJM 2016
- Brott et al, NEJM 2016
Carotid Artery Stenting

The CREST Trial (Brott et al, NEJM 2010)

Figure 1. Hazard ratios (and associated 95% confidence intervals) for the primary endpoint and selected efficacy and safety endpoints comparing CAS vs. CEA.
Carotid Artery Stenting

CREST 10 year Results

Brott et al, NEJM 2016
Carotid Artery Stenting

ACT-1 trial for asymptomatic carotid artery stenosis

18 times fewer strokes than the medical arm of NASCET

Rosenfield K et al, NEJM 2016
Vertebrobasilar Stenosis

The VERITAS Trial shows us that stroke risk from posterior circulation atherosclerotic disease is largely related to flow status.

Vertebrobasilar Stenosis

VERITAS enables us to risk stratify patients and prescribe therapy that is proportional to their ongoing stroke risk

Vertebrobasilar Stenosis

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U.S. Prospective ICAD Stent Trials

- **Wingspan HDE approval trial** – Stroke 2007 – **ON label**
  - 44 patients, **4.5%** peri-procedural morbidity

- **N.I.H. funded registry** – Neurology 2008 – **ON label**
  - 129 patients, **6.0%** peri-procedural morbidity

- **Boston Scientific registry** – Stroke 2007 – **ON label**
  - 78 patients, **6.1%** peri-procedural morbidity

- **SAMMPRIS trial** – NEJM 2011 – Primarily **OFF label**
  - 224 patients, **14.7%** peri-procedural morbidity
  - Results slowed or stopped intracranial stenting at many U.S. hospitals
Patient Selection
Critical for ICAD similar to LVO

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<thead>
<tr>
<th></th>
<th>Hemodynamic compromise</th>
<th>Embolic</th>
<th>Perforator stroke alone</th>
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<tbody>
<tr>
<td>Stenting</td>
<td>+++</td>
<td>++</td>
<td>?</td>
</tr>
<tr>
<td>Medical therapy</td>
<td>+</td>
<td>+++</td>
<td>+++</td>
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The latest in management of intracranial atherosclerosis disease (ICAD)

- Patient selection is key
- Interim data from first 100 patients very encouraging
- Much lower complication rate (2.9%) than Sampriss (14.7)
Our specialists offer experience and personalized treatment to all our patients. Our multidisciplinary experts are leaders in their field and contribute to the advancement of knowledge and understanding of neurovascular disease.

Multidisciplinary team approach to treatment and advancing understanding cerebrovascular disease.