Tempus Cerebrum Est: Treating Acute Stroke in the First Minutes After Onset

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Director, UCLA Comprehensive Stroke Center
In a typical acute ischemic stroke, every minute the brain loses

• 1.9 million neurons

• 14 billion synapses

• 7.5 miles myelinated fibers

-- Saver, Stroke 2006
Time to IV TPA Treatment and Benefit
58,353 Patients from 1395 GWTG-Stroke Hospitals

For every 15 min delay, among 1000 patients:

- 18 will have worse ambulation at discharge
- 13 more will be discharged to a less independent environment
- 4 more will die prior to discharge

--JAMA 2013;309:2480-8
Total Ischemia Time Determines Outcome from Endovascular Reperfusion

480 patients from 7 studies

Benefit Declines Exponentially

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We need to climb the mountain

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UCLA Stroke Center

Tempus Cerebrum Est: Intravenous Thrombolysis
### Door to Needle Times in Best Practice Hospitals

<table>
<thead>
<tr>
<th>Stroke Center</th>
<th>Median Door to Needle Times</th>
</tr>
</thead>
<tbody>
<tr>
<td>Helsinki, Finland</td>
<td>20 mins</td>
</tr>
<tr>
<td>Erlangen, Germany</td>
<td>25 mins</td>
</tr>
<tr>
<td>Wash U, St. Louis</td>
<td>39 mins</td>
</tr>
</tbody>
</table>

--- Meretojoa et al, Neurology 2012
--- Ford et al, Stroke 2012
TARGET: STROKE
TIME LOST IS BRAIN LOST.

STROKEASSOCIATION.ORG/TARGETSTROKE
Tempus Cerebrum Est: Mechanical Thrombectomy
## Endovascular Time Targets

<table>
<thead>
<tr>
<th>Time Metric</th>
<th>Multi-Society Guideline 2013</th>
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--J Vasc Interv Radiol 2013;24:151-63
## Endovascular Time Targets

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<tr>
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<td>120 min (2h)</td>
</tr>
</tbody>
</table>

--J Vasc Interv Radiol 2013;24:151-63
Tempus Cerebrum Est: Prehospital Care
Stroke and the Golden Hour

• Narrow therapeutic time window
• Early intervention critical for stroke care
• Prehospital personnel
  » 35-70% of stroke patients arrive by ambulance
  » Unique position: first medical professional to come in contact with stroke patient

UCLA Stroke Center
## Prehospital Stroke Trials

<table>
<thead>
<tr>
<th>Trial</th>
<th>Intervention</th>
<th>Strategy</th>
<th>Design</th>
<th>Size</th>
<th>Status</th>
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</thead>
<tbody>
<tr>
<td>FAST-MAG Pilot</td>
<td>Magnesium</td>
<td>NP</td>
<td>Historical controls</td>
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<tr>
<td>Helsinki EMS</td>
<td>IV + SQ Insulin</td>
<td>Homeo-stasis</td>
<td>Randomized open / hist cont</td>
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<td>Aarhus University</td>
<td>Remote perconditioning</td>
<td>NP</td>
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<tr>
<td>RIGHT</td>
<td>Glyceryl trinitrate</td>
<td>BP</td>
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<tr>
<td>PIL-FAST</td>
<td>Lisinopril</td>
<td>BP</td>
<td>Randomized open label</td>
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<td>2013</td>
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<tr>
<td>FAST-MAG Pivotal</td>
<td>Magnesium</td>
<td>NP</td>
<td>Randomized, blinded placebo</td>
<td>1700</td>
<td>2014</td>
</tr>
</tbody>
</table>
Fast and Furious
The Future of Acute Stroke Care

Variants of the stroke rescue chain

average times (in minutes)

0 30 60 90 120 150

Time to treatment

Regular care
drive to scene First aid Transport to hospital In-hospital diagnostic work-up

Time to protection

FAST-MAG
drive to scene First aid and study inclusion Transport + in-advance notification In-hospital diagnostic work-up

Time to treatment

STEMO
drive to scene First aid and diagnostic work-up Routing to specialized facility In-hospital work-up

- tPA bolus
- Magnesium infusion
- tPA bolus
- intra-arterial treatment

--Audebert et al, Neurology 2013;81:501-8