Emotional disturbances in animals models of ischemia

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%25 of all publications in the field of neuroscience contain behaviour data
Outcomes after mild ischemia

- Neurological, sensory-motor function
- Cognitive function, memory, executive function
- Neuropsychiatric outcome
Our Test Arsenal

- Sensory / Motor
- Cognitive / Memory
- Depression / Anxiety / Activity
Model of mild ischemia in mice

129 SV mice, 30 min filamentous MCAo
Model of mild ischemia in mice

TUNEL

NeuN
double

green
red
yellow

TUNEL

GFAP
double

green
red

TUNEL

Mac1
double

green
red
Model of mild ischemia in mice
Sensory / motor

Wire Hanging

Measure:
- Time hanging
Sensory / motor

Pole Test

Measure:
- Time to Turn
- Time to reach the floor
• Neurological, sensory-motor function

Several weeks after injury mice have mild neurological deficits (forepaw flexion) and "normal" locomotor activity
Memory

Water Maze

Measure (Place task):
- Time to reach the platform
- Speed

Measure (probe trial)
- Time spent in each quadrant
- Platform crosses
- Speed
place task
Probe trial

sham

stroke

Stroke 2004
Probe trial

Target preference analysis
((T-A)+(T-B)+(T-C))/3

Sham
Stroke

0-30 sec 30-60 sec 60-90 sec

Stroke 2004
Visible platform trial

**Trial 1**

**Trial 2**

**Trial 3**

**Sham**

**Stroke**
Visible platform trial

- Bar graph showing time in former target quadrants for Trials 1, 2, and 3, with two conditions: Sham and Stroke.
  - Trial 1: Sham > Stroke
  - Trial 2: Sham > Stroke
  - Trial 3: Sham > Stroke

- Scatter plot showing time in former target quadrant against brain lesion size in mm³.
  - Correlation coefficient: r = 0.731
  - Significance: p < 0.05
• Cognitive function, memory, executive function

Mice learn normally but have deficits in strategy-switching resembling a „dysexecutive syndrome“
Neuropsychiatric outcome

- Sham vs left MCAo vs. right MCAo
- 12 weeks survival
- Activity
- Anxiety
Neurochemical alterations

Biol Psych 2005
spontaneous locomotor activity

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<th>sham</th>
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Biol Psych 2005
spontaneous locomotor activity
Anxiety

❖ Elevated Plus Maze

Measure:
❖ Time on open arm
❖ Distance on the open arm
❖ Speed
❖ Total distance
❖ Time on the middle square
❖ Head dips
Elevated plus maze

Biol Psych 2005
Elevated plus maze

![Graph showing time in open arm with comparisons between Sham, IMCAo, and rMCAo conditions.](Biol Psych 2005)
Open field (also anxiety test)

Measure:
- Total distance
- Activity time
Anxiety

Light/Dark Box

Measures:
- Time in the bright compartment
- Time in the dark compartment
- Latency to enter Dark or Bright compartment
- Crosses or Speed
Despair

Tail suspension test

Measure:
- Total time immobile
Depression

Porsolt’s Forced Swim Test

Measure:
- Floating latency
- Total time spent floating
Outcome after mild ischemia

- Neuropsychiatric outcome (1)

  spontaneously hyperactive ($r > l$),

  anxious-avoidant ($l > r$)
Outcome after mild ischemia

- Neurological, sensory-motor function
- Cognitive function, memory, executive function
- Neuropsychiatric outcome
Tipps for Beginners

- Always have a hypothesis before deciding on your behaviour tests
- Read available literature but don’t rely (believe) on it!!!
- Know the limitations of the test you choose well.
- Be aware that strain differences mean a lot!!!
- Beware of the KO! Get ready for all types of surprises.
- Train your self more than your animals!
- Never use your real experimental group in a test that you are not familiar with

*self experience gained in painful and depressing trials. 😊
Selected Literature


• Anxious and hyperactive phenotype following brief ischemic episodes in mice. Biol Psychiatry. 2005 May 15;57(10):1166-75.