Damage to specific regions of the brain determines symptoms of Parkinson’s disease

JOHNATHAN VINKAVICH
The Brain and How it Works
The Brain and How it Works
The Brain and How it Works

A. Feedforward excitation

B. Feedforward inhibition

C. Convergence/divergence

D. Lateral inhibition

E. Feedback/Recurrent inhibition

F. Feedback/Recurrent excitation

http://nba.uth.tmc.edu/neuroscience/m/s1/images/copyright_marked_images/intro-06.jpg
The Brain and How it Works
The Brain and How it Works

MOVEMENT
The Brain and How it Works

Nature Reviews | Neuroscience
The Brain and How it Works
Parkinson’s Disease

Stooped posture
Shaky hands
Parkinson’s Disease

**MOTOR SYMPTOMS**

- Tremor
- Bradykinesia (slowness)
- Rigidity
- Poor Balance
Parkinson’s Disease

Substantia nigra, dopamine-producing cells
Parkinson’s Disease

FEWER PEOPLE HAVE LOOKED AT THE VTA AND ITS OUTCOMES
Parkinson’s Disease

**MOTOR SYMPTOMS**
- Tremor
- Bradykinesia (slowness)
- Rigidity
- Poor Balance

**MOOD SYMPTOMS**
- Sadness
- Loss of Appetite
- Apathy
- Depression
Parkinson’s Disease

**MOTOR SYMPTOMS**
- Tremor
- Bradykinesia (slowness)
- Rigidity
- Poor Balance

**MOOD SYMPTOMS**
- Sadness
- Loss of Appetite
- Apathy
- Depression
What I Did

http://www.criver.com/getmetafile/774601a4-d409-4c8d-8c75-e8f64dc08e80/SHROB_Rat_417x235.aspx
What I Did
What I Did

6-OHDA/AA
What I Did
What I Did
What I Found: Lesions

![Bar Chart]

- **TH+ Cell Count**
- **Sham**
  - SNC: ~6000
  - VTA: ~4000
- **Partial**
  - SNC: ~2000
  - VTA: ~3000
- **Lesion**
  - SNC: ~1000
  - VTA: ~1000

- SNC
- VTA
What I Did
What I Found: Step Test

$R^2 = 0.63771$

$R^2 = 0.7374$
What I Found: Step Test

What I Found: Step Test

Mean Steps with Lesioned Side

TH+ Cell Count

R² = 0.64793
R² = 0.85194
What I Did
What I Found: Cylinder Test

L/R Paw Touches in 5 min Cylinder Test

TH+ Cell Count

R² = 0.51059
R² = 0.434
What I Found: Cylinder Test

L/R Paw Touches in 5 min Cylinder Test

- **Right Preference**
- **No Preference**
- **Left Preference**

$R^2 = 0.51059$

$R^2 = 0.434$
What I Expected

Step Test  \( SNC > VTA \)

Cylinder Test  \( SNC < VTA \)
What I Found

<table>
<thead>
<tr>
<th>Test</th>
<th>SNc</th>
<th>VTA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Step Test</td>
<td>$\text{SNc} &lt; \text{VTA}$</td>
<td></td>
</tr>
<tr>
<td>Cylinder Test</td>
<td>$\text{SNc} = \text{VTA}$</td>
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</tbody>
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What I Found

“It’s not that they can’t step, it’s that they don’t want to”
Thank You To the Following

<table>
<thead>
<tr>
<th>RFUMS</th>
<th>LFC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anthony West</td>
<td>Shubhik DebBurman</td>
</tr>
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<td>Vatsala Jayasinghe</td>
<td>Lynn Westley</td>
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<tr>
<td>Suhag Patel</td>
<td>Ashwin Iyegar</td>
</tr>
<tr>
<td>Voctoia Hoch</td>
<td>Geeta Verma</td>
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Questions?