

# CASE STUDY

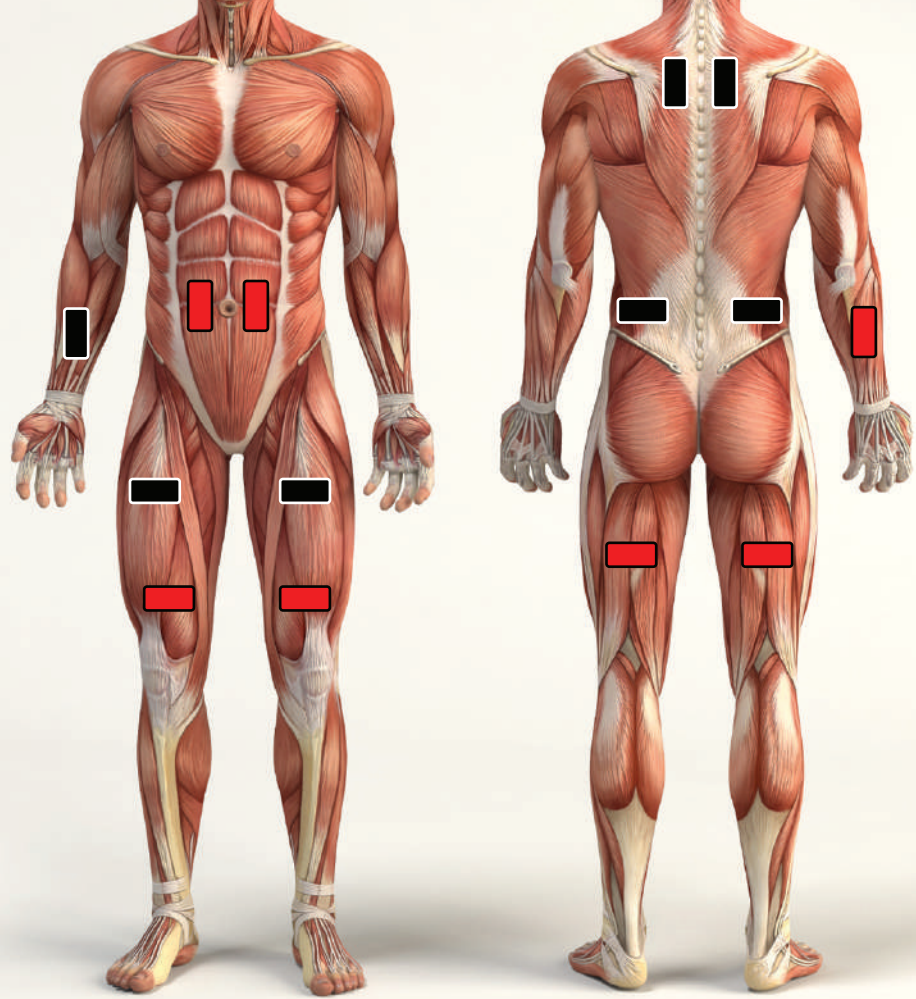
## Improving Strength and Function in Parkinson's Disease with The Neubie: A Case Report

**PERFORMED BY & LOCATION:**  
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**KEY WORDS:**  
Improving functional strength with exercise and Neubie DC current in Parkinson's Disease

### DIAGNOSIS:

Parkinson's Disease. C/c: generalized weakness, lack of independence.



### TREATMENT AND OUTCOME

Patient is a 78 year old female diagnosed with Parkinson's Disease in 2017. Patient presents with R hand tremor (starting in 2015), stooped posture, decreased cadence and foot clearance during gait, balance disturbances, difficulty walking, dysmetria, bradykinesia, and hypophonia.

PT sessions 2x/week were performed for 12 weeks consisting of strength training and functional exercises with the Neubie device.

## CLINICAL FINDINGS

### BEFORE

#### FLR Survey Results

SURVEY COMPLETED	SURVEY SCORE
Falls Efficacy Scale	42.0
Berg Balance Scale	18.0

TEST	LEFT
Timed Up and Go	Result: 22.6sec

#### Strength Measurements

MANUAL MUSCLE TESTS		
BODY PART	LEFT	RIGHT
Iliopsoas	4 / 5	4- / 5
Gluteus Maximus	3+ / 5	3 / 5
Gluteus Medius	3 / 5	3 / 5
Quadriceps	4- / 5	4+ / 5
Hamstrings	4+ / 5	4+ / 5
Anterior Tibialis	4 / 5	4 / 5
Gastronemius	4 / 5	4 / 5
Anterior Deltoid	4 / 5	3+ / 5
Middle Deltoid	4 / 5	4 / 5
Biceps	4 / 5	4- / 5
Triceps	4 / 5	3+ / 5
Pronator Teres/Quadratus	4 / 5	4- / 5

### AFTER

#### FLR Survey Results

SURVEY COMPLETED	SURVEY SCORE
Berg Balance Scale	41.0
Falls Efficacy Scale	29.0

OTHER GENERAL TESTS	
TEST	LEFT
Timed Up and Go	Result: 10.3sec

#### Strength Measurements

MANUAL MUSCLE TESTS		
BODY PART	LEFT	RIGHT
Iliopsoas	4+ / 5	4 / 5
Quadriceps	5 / 5	5 / 5
Hamstrings	5 / 5	5 / 5
Anterior Tibialis	4+ / 5	4 / 5
Gastronemius	5 / 5	5 / 5
Anterior Deltoid	4+ / 5	4 / 5
Middle Deltoid	4+ / 5	4+ / 5
Biceps	5 / 5	5 / 5
Triceps	5 / 5	5 / 5
Pronator Teres/Quadratus	4+ / 5	4 / 5

Overall outcomes include improvements in strength as shown by MMT testing, improvements in functional mobility and balance as shown by TUG test and BERG Balance scale.

## TREATMENT AND OUTCOME

Upon initial evaluation, assessment included independence level for transfers, gait assessment, strength testing, and functional outcome measures. **TREATMENT APPROACH:** Functional strengthening, part-tasking ADLs, postural education, R hand stretching/strengthening, gait training, and neuromuscular re-education.

## PAD PLACEMENTS & EXERCISES

### CHANNEL 1

**Black** Right Wrist Flexors

**Red** Right Wrist Extensors

### FREQ

500pps, 100pps

### EXERCISE

2x15

Grasping (3s/3s)

Wrist Flex/Ext

Wrist Sup/Pro

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### CHANNEL 1

**Black Glove** on Therapist's Hand

**Red** Right Bicep

### FREQ

500pps

### EXERCISE

PROM of right wrist, fingers

STM to right hand/wrist musculature

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### CHANNEL 1

**Black** in Bath

**Red** Right Bicep

### FREQ

500pps

### EXERCISE

Hand bath - 15min



**CHANNEL 1**

**Black** Right Rhomboids

**Red** Right Low Back

**CHANNEL 2**

**Black** Left Rhomboids

**Red** Left Low Back

**CHANNEL 3**

**Black** Right Prox Quad

**Red** Right Distal Quad

**CHANNEL 4**

**Black** Left Prox Quad

**Red** Left Distal Quad

**FREQ**

500pps

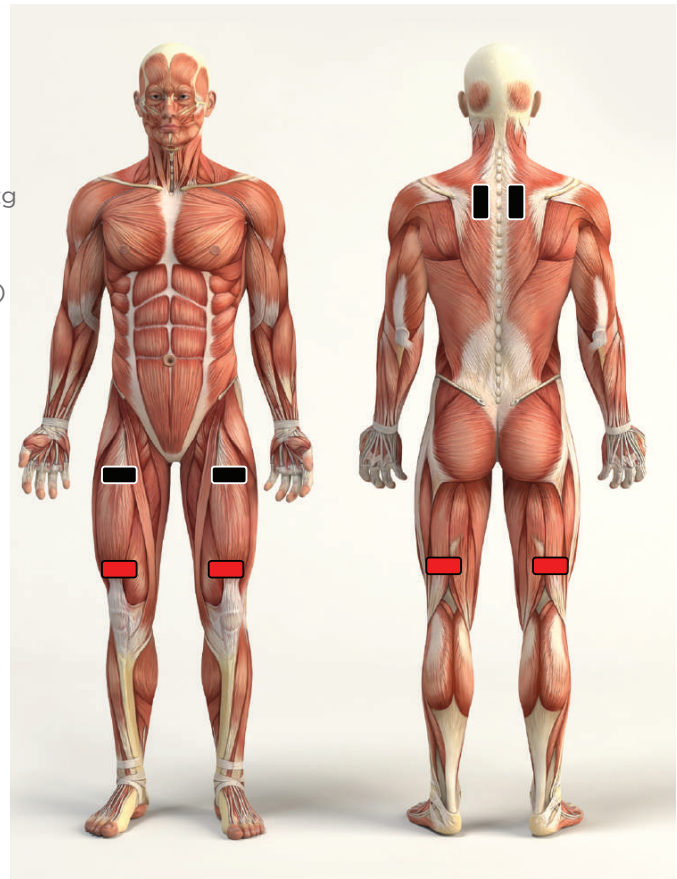
**EXERCISE**

Stepping fwd/back 2xftg

Walking c RW 3xftg

Salom Cones x4 (HHA)

Standing Taps (balance)  
2xftg



**CHANNEL 1**

**Black** Right Low Back

**Red** Right Upper Back

**CHANNEL 2**

**Black** Left Low Back

**Red** Left Upper Back

**CHANNEL 3**

**Black** Right Quad

**Red** Right HS

**CHANNEL 4**

**Black** Left Quad

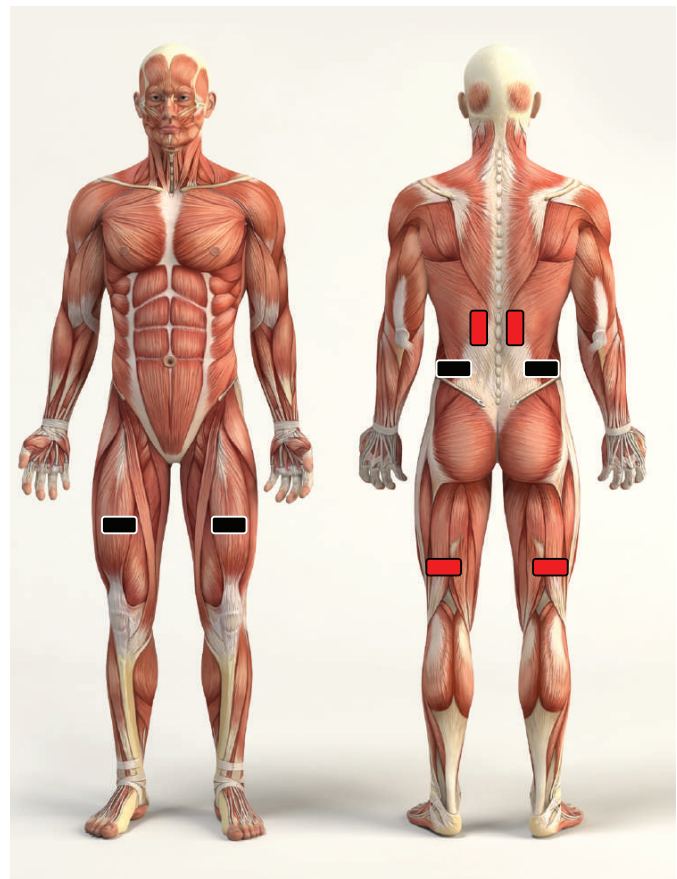
**Red** Left HS

**FREQ**

500pps

**EXERCISE**

2 laps marching w/RW



**CHANNEL 1**

**Black** Right Low Back

**Red** Right Upper

Back

**CHANNEL 2**

**Black** Left Low Back

**Red** Left Upper Back

**FREQ**

500pps

**EXERCISE**

3x10

Seated Flex/Ext

Seated SB

Seated Rotation

**CHANNEL 1**

**Black** Right Rhomboids

**Red** Right Low Back

**CHANNEL 2**

**Black** Left Rhomboids

**Red** Left Low Back

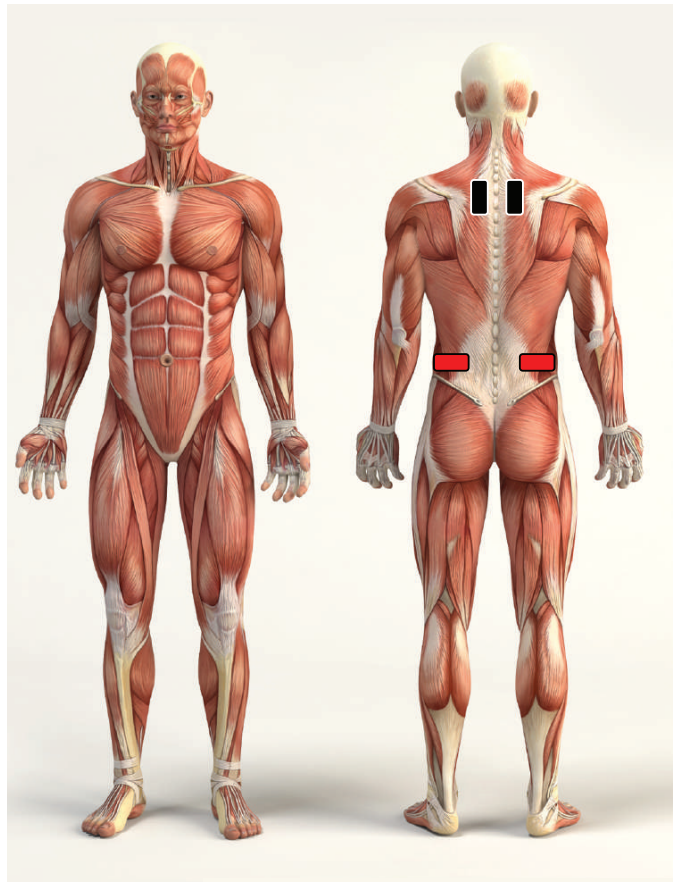
**FREQ**

500pps

**EXERCISE**

3x20 Scapular Retraction

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**CHANNEL 1**

**Black** in Water

**Red** Right forearm

**CHANNEL 3**

**Black** Right Neck

**Red** Right Foot

**CHANNEL 3**

**Black** Left Neck

**Red** Left Foot

**FREQ**

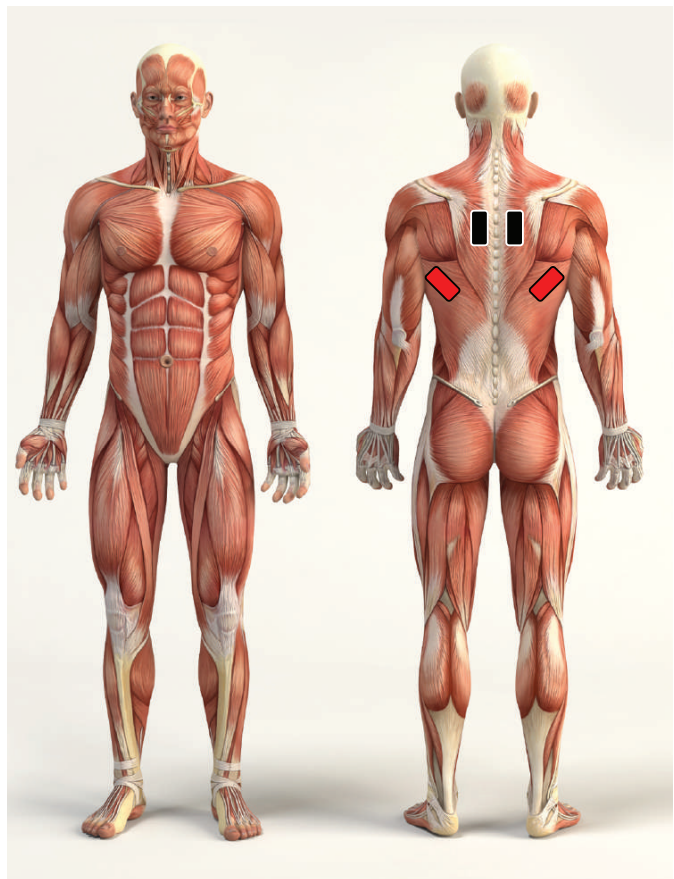
500pps

**EXERCISE**

Hand Bath x 10

Master Reset x 15

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**CHANNEL 1**

**Black** Glove

**Red** Right forearm

**FREQ**

500pps

**EXERCISE**

Glove work to R hand for neuromuscular re-education, stretching R fingers & opening hand.

### CHANNEL 1

**Black** Right Rhomboids

**Red** Right Lats

### CHANNEL 2

**Black** Left Rhomboids

**Red** Left Lats

### FREQ

500pps

### EXERCISE

Seated Rows (YTB) 3x15

### CHANNEL 1

**Black** Right Rhomboids

**Red** Right Lats

### CHANNEL 2

**Black** Left Rhomboids

**Red** Left Lats

### CHANNEL 3

**Black** Right Glute Med

**Red** Right Quads

### CHANNEL 4

**Black** Left Glute Med

**Red** Left Quads

### FREQ

500pps

### EXERCISE

Standing NBOS, SGA 3x30 seconds

Standing NBOS EC, CGA 3x15 seconds

Stand, "big" step forward & back,

Sit-minA 3x8

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## EVALUATION

**PROCESS:** Manual Muscle Testing (MMT), scan & observation of posture/gait

**FINDINGS:** R hand tremor (starting 2 years prior), stooped posture, decreased cadence and foot clearance during gait, balance disturbances, difficulty walking, dysmetria, bradykinesia, and hypophonia.

**ASSESSMENT:** Patient will benefit from PT interventions including strengthening, functional mobility, balance training, and hand dexterity exercises.

## SUBSEQUENT TREATMENT SESSIONS

**FREQUENCY:** 2x/week for 12 weeks

**TECHNIQUES USED IN FOLLOW UP SESSIONS:** Functional training, strengthening exercises, glove work to R hand for tremors, Neubie glove on R hand with strengthening and hand dexterity exercises.

### **FREQUENCIES USED:**

- 500pps during warm ups, R hand exercises, and gait training
- 40pps (set 1), 55pps (set 2), 75pps (set 3) when working on strengthening or lower extremities and postural re-education

## RESULTS AFTER ALL THE TREATMENT COMPLETED (OR CURRENT RESULTS IF STILL BEING TREATED):

Improvement in strength in the following muscles: quadriceps, hamstrings, anterior tibialis, gastrocnemius, anterior deltoid, middle deltoid, biceps, and triceps. Ambulation improved as shown by tolerating ambulating 50ft CGA without AD. Transfers improved by tolerating STS and toilet transfers SBA.

**ADVERSE EFFECTS:** patient was very sensitive to the stimulation (tolerates between 8-15% intensity).

## **DISCUSSION**

During this case report, strengths included the hands-on approach of seeing the patient every week 2x/week for 12 weeks in the clinic. Limitations included lack of patient independence at home, decreasing her ability to perform HEP.

### **RESULTS INCLUDE:**

- Improvement to gross motor strength as shown in MMT findings
- Statistically significant improvement in balance as shown in the BERG balance scale from 18/45 to 41/15
- Improvement in gait/ambulation as shown in TUG test from 22.6s to 10.3s
- Improvement in patient confidence and risk for falls as shown by Falls Efficacy Scale from 42 to 29

The results of this case report concludes that a treatment approach with functional exercise and DC current from the Neubie can significantly improve strength, balance, gait, and overall function in a Parkinson's Disease patient.