

Impact of OMM on Parkinson's Disease: Lessons Learned and Future Directions

Financial Disclosures



- American Osteopathic Association (AOA) Research Grant
- RFA: The Osteopathic Approach & Parkinson's Disease
- Grant No.: 431607710 Amount Approved: \$139,708.00 Funding Period: September 1, 2016 – August 31, 2018
- “Effect of Osteopathic Manipulative Medicine on Balance, Motor Function, and Biomarkers in Parkinson’s Disease” PI – Sheldon Yao, DO

Introduction

- NYITCOM Alumni
- FM/OMM & NMM/OMM certified
- Joined OMM department 2006
- Academic Medicine
- Teaching
- Patient care
- Research



*College of
Osteopathic
Medicine*



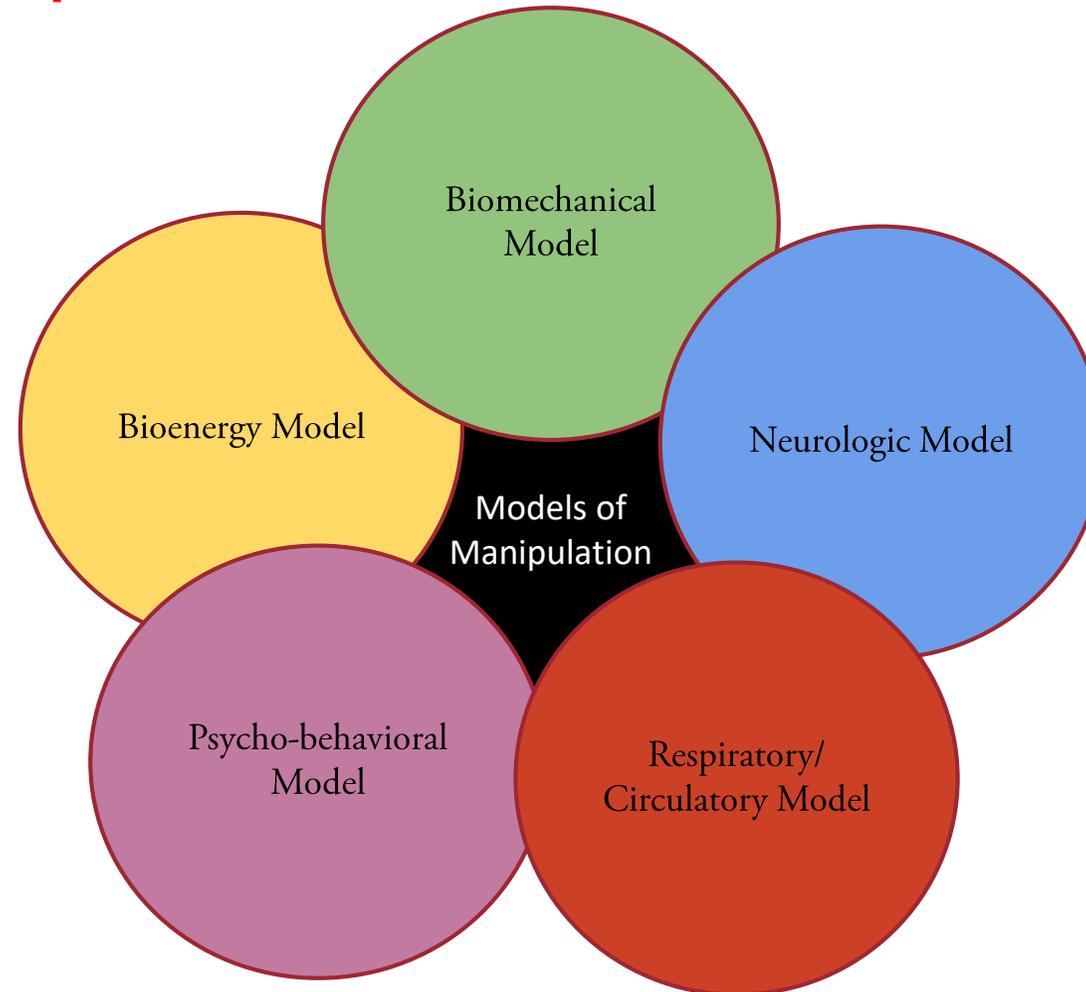
What is OMM?



Osteopathic Approach

- An osteopathic approach takes into consideration how the physician can manually diagnose and treat somatic dysfunctions that is contributing to the patient's pain and preventing optimal health and healing.
- Osteopathic physicians utilize the 5 models of osteopathic care as an approach our patients.

Osteopathic Manipulative Medicine – Models of Treatment



Osteopathic Manipulative Medicine – Goals of Treatment

- Relieve pain and reduction of other symptoms
- Improvement of function
- Increase functional movement
- Improve blood supply and nutrition to the affected areas
- Promote fluid flow via the lymphatic and venous systems
- Remove impediments to normal nerve transmission and balance autonomic innervation



How to tie in research and OMM?



Research starts with asking the right questions

- What is your hypothesis?
- How would it impact the field?
- Does not have to be only clinical.
- Does it forward the understanding of osteopathic techniques or principles?



Research starts with asking the right questions

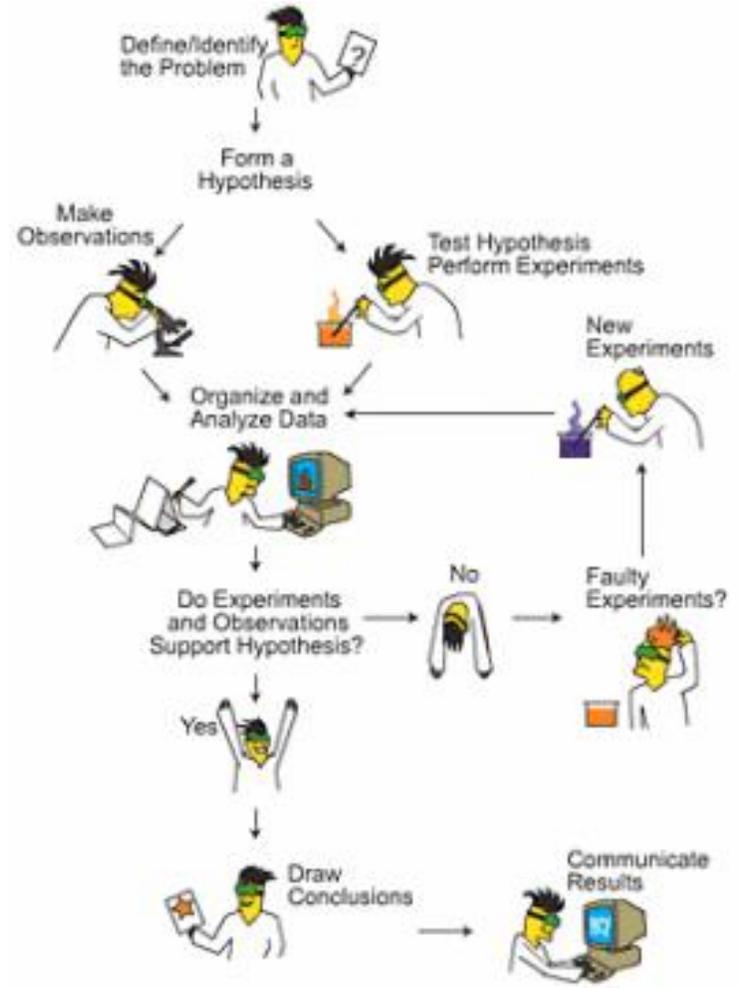
Exercise

- Pair up in groups of 2-3
- Share 1 or 2 ideas of possible research ideas that you would be interested in conducting.
- Share some ideas and list possible challenges.



Research component

- What was the general process most of you came up with?
- What are some ideas for osteopathic research?
- What were some barriers?



Common barriers to consider

- Time
- Resources
- Ideas
- Not sure where to start
- Mentors
- Gold standard double blind randomized control study
- Osteopathic manipulative medicine is a procedure
- Standardizing an OMM protocol is not how osteopathic medicine is clinically practiced



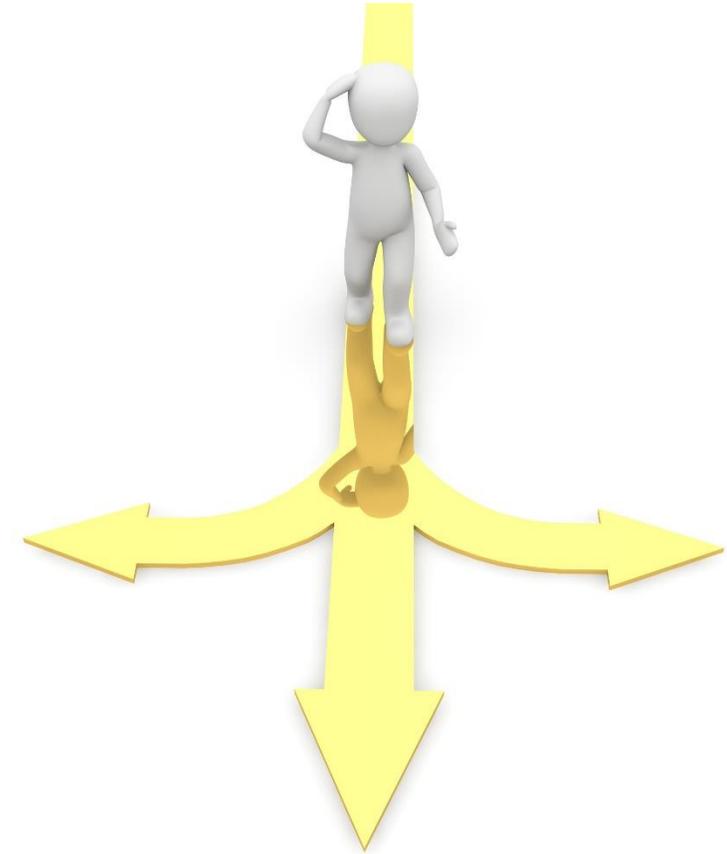
Confounding factors

- Placebo effect
- Effect of touch
- Physician empathy
- Difficulty in establishing a sham control arm



Sharing and learning from my personal research experience

- Student driven ideas
- Understand your resources
- Start with small steps/goals
- Finding mentors and collaborators
- Turning posters to papers
- Persevering through publication process



Defining & Quantifying **Scholarly Activity**

- Articles – reviews, impact factor
- Book chapters
- Abstracts
- Conference Presentations- local vs national
- Poster presentations
- Peer Reviewer – Journal
- Teaching/lecturing – audience

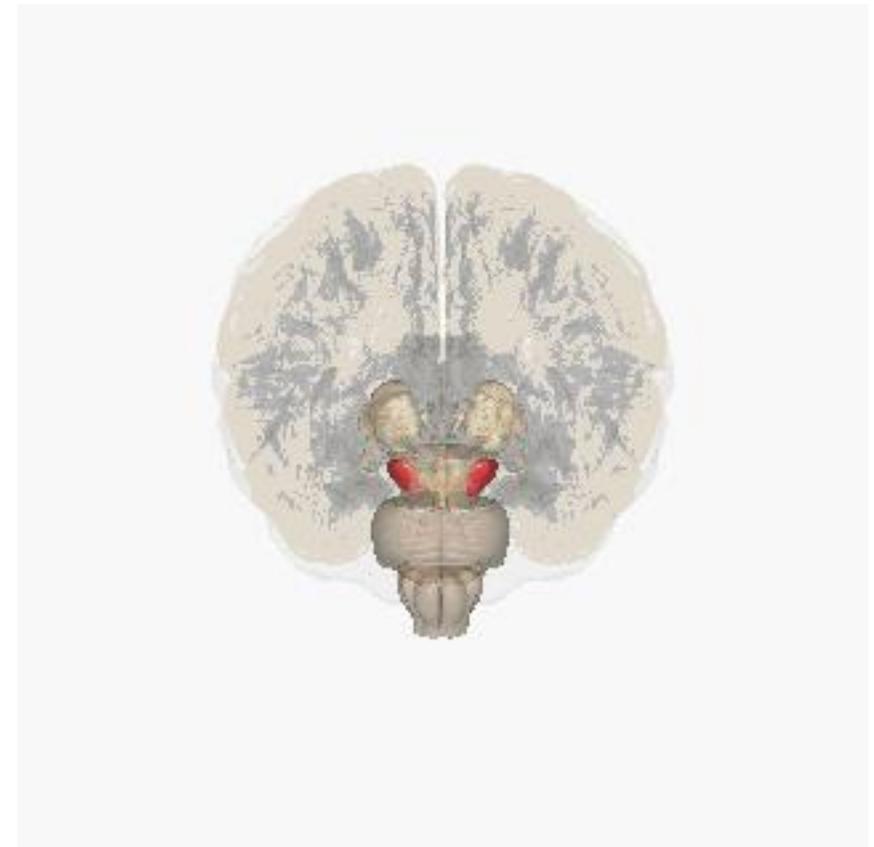


Osteopathic Research

- Important to know what has been done prior
- Conduct a thorough literature search
- Build from what has been established
- Review limitations and recommendations in discussion

Parkinson's disease

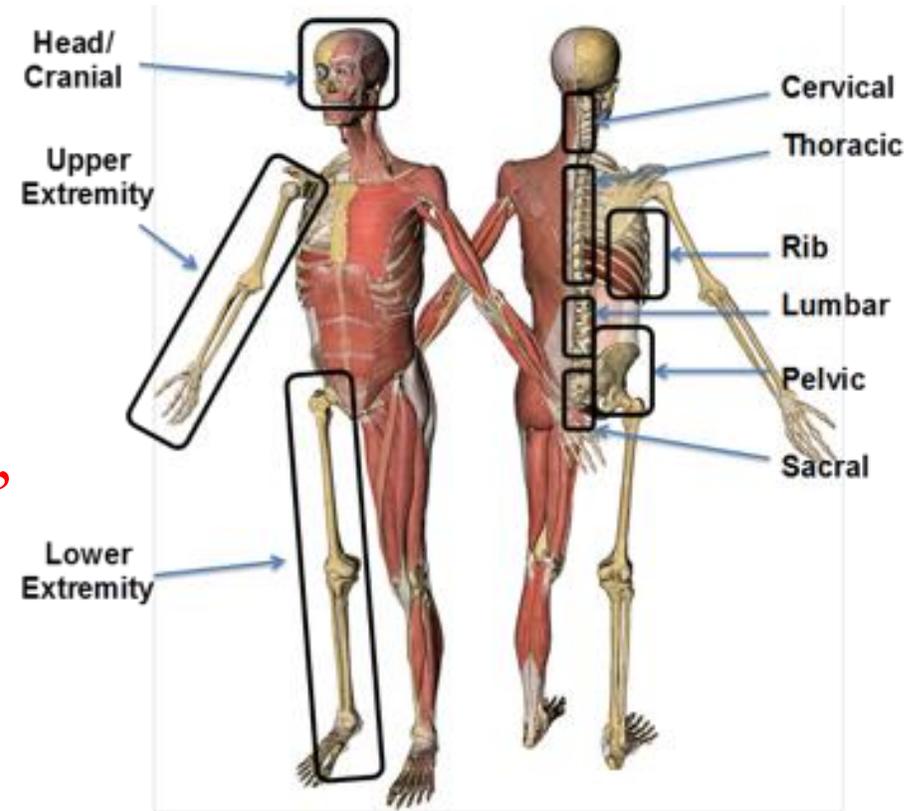
- Neurodegenerative disorder that affects the basal ganglia
- Basal ganglia mediate sensory, motor, and cognitive activities for goal-directed movement
- The main neurons affected make dopamine and do not work properly.
- Dopamine normally sends signals that help coordinate movements.
- Motor symptoms typically include resting tremor, rigidity, bradykinesia, and postural instability.
- Non-Motor symptoms include autonomic dysfunction, gut microbiome imbalance, excessive day-time fatigue & somnolence, circadian abnormalities, and mood disorders.



Source: Wikimedia Commons

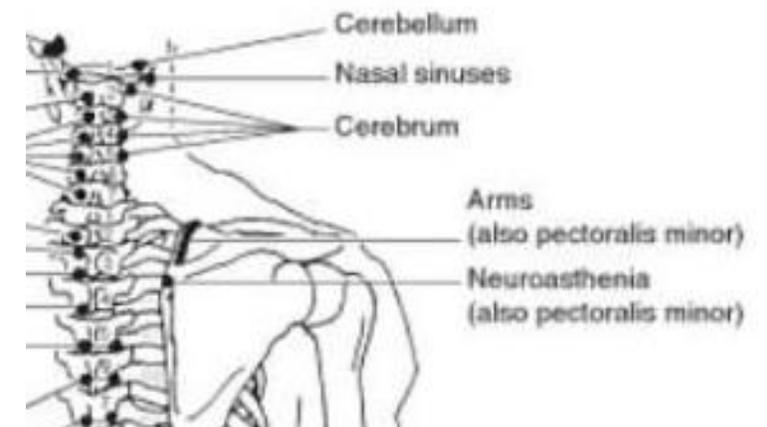
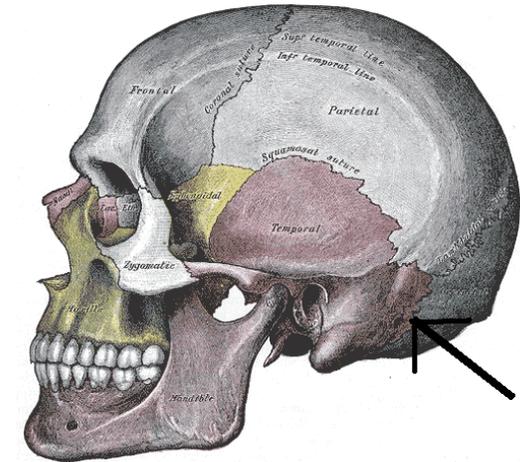
Osteopathic Manipulative Medicine

- Addresses musculoskeletal dysfunctions in the body.
- With Parkinson's disease, increased muscle rigidity leads to a cycle of pain, muscle spasms, and decreased mobility.
- NYITCOM PD center with over 300 PD members
- Many receive OMM treatments

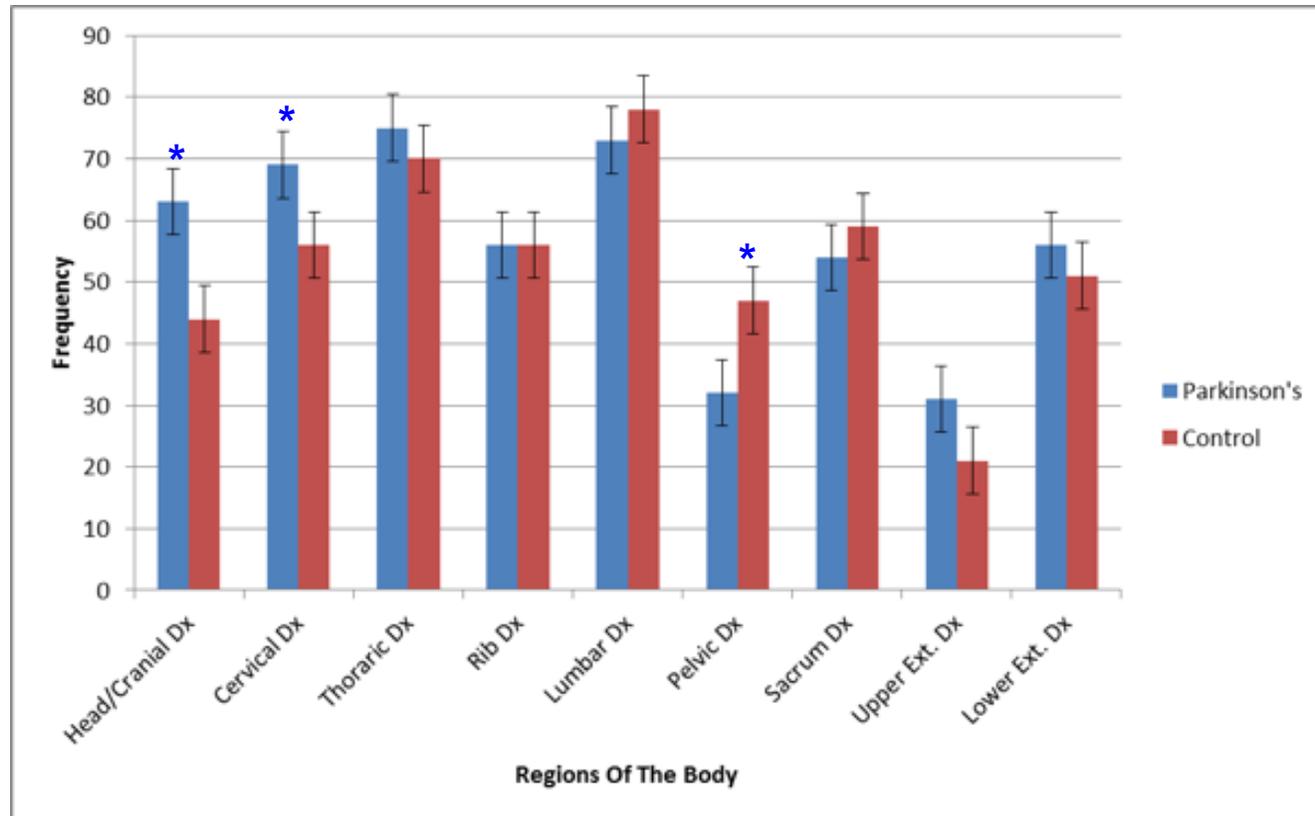


Prior Parkinson's Disease Somatic Dysfunction Research

- S Rivera-Martinez; MR Wells; JD Capobianco
- Recorded observations of cranial strain patterns of patients with Parkinson's disease.
- Patients with Parkinson's disease had a higher frequency of bilateral occipitoatlantal compression (87% vs. 50%) and bilateral occipitomastoid compression (40% vs. 10%) compared with normal controls.
- JAOA • Vol 102 • No 8 • August 2002 • 417-422



Comparison of frequency of somatic dysfunctions in body regions between PD and MSK pain group (Age matched, n=80)



PD cases had significantly more head/cranial ($P < .01$, $OR = 0.21$) and cervical diagnoses ($P = .01$, $OR = 0.28$).
The controls had significantly more pelvic diagnoses than PD subjects ($P < .01$, $OR = 3.14$).

Effect of OMM on Pulmonary Function and Speech in PD

OMT protocol

- Seated thoracic spine articulation
- Rib articulatory technique
- Doming diaphragm
- Thoracic outlet release
- Pectoralis traction

Light Touch

Mirroring OMT protocol in positioning and amount of time using dorsum of hand along the posterior thoracic cage, costal margin, thoracic outlet, and anterior axillary folds.

- Outcome measures:
- Pulmonary function
- Speech
- Chest Circumference

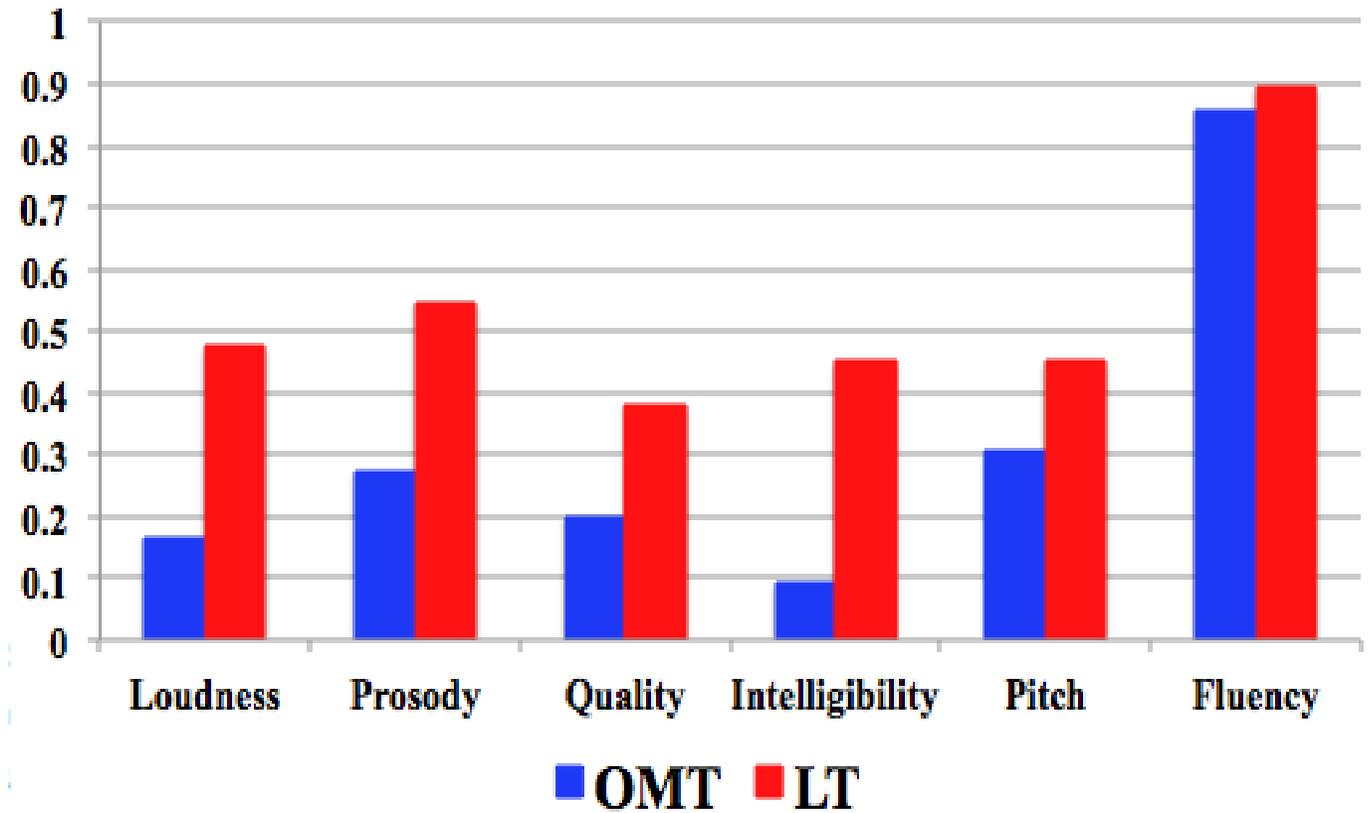
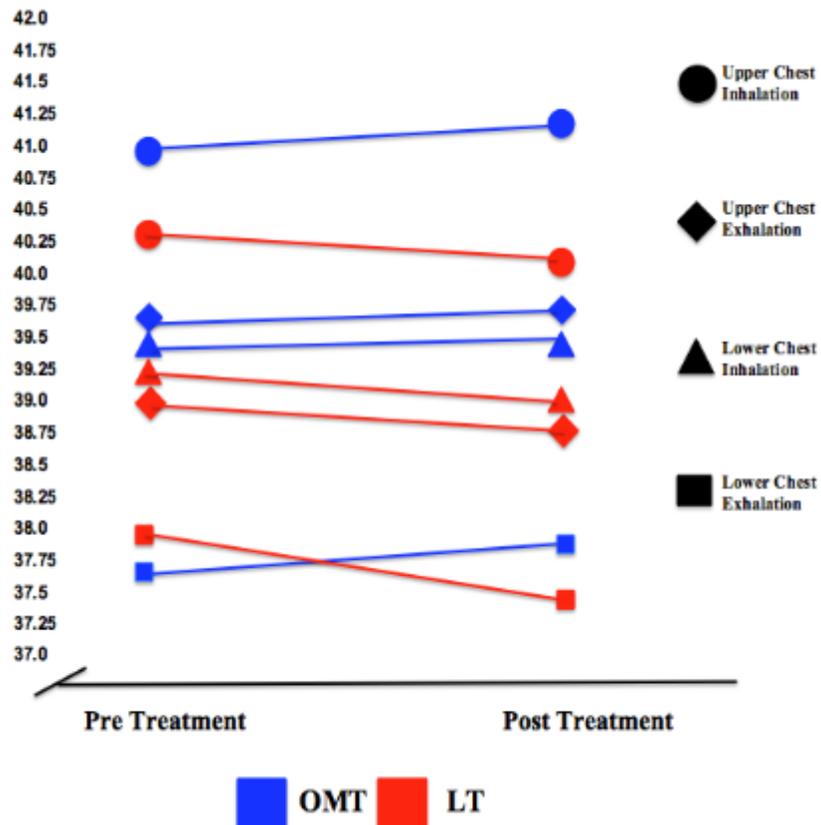
Baseline Characteristics		OMT N=25	LT N=25	
		Mean (SD)		p-value ¹
Age		67.8 (11.14)	68.3 (14.4)	.887
BMI		26.47(5.80)	26.32(4.65)	.929
		n(%)		p-value ¹
Gender	Male	15 (60%)	18 (72%)	.370
	Female	10 (40%)	7 (28%)	
Race	Caucasian	23 (95.8%)	21 (87.5%)	.297
	Other	1 (4.2%)	3 (12.5%)	
H-Y Scale ²	1	5 (20.8%)	4 (16.7%)	.636
	2	7 (29.2%)	6 (25%)	
	3	9 (33.3%)	7 (29.2%)	
	4	2 (8.3%)	5 (20.8%)	

Effect of OMM on Pulmonary Function and Speech in PD

Variable		Mean Pre	Mean Post	p-value
FVC (Liters)	LT	3.47	3.44	0.91
	OMT	3.22	3.21	
FEV1 (Liters)	LT	2.54	2.29	0.55
	OMT	2.27	2.30	
FEV1/FVC (%)	LT	74.08	74.14	0.44
	OMT	72.40	70.96	
PEF (Liters)	LT	4.41	4.32	0.33
	OMT	3.83	3.72	
MVV (L/Min)	LT	52.54	56.24	0.91
	OMT	54.31	56.37	
Upper chest inhalation (inches)	LT	40.38	40.18	0.90
	OMT	41.04	41.36	
Lower chest inhalation (inches)	LT	39.27	39.00	0.94
	OMT	39.37	39.48	
Upper chest exhalation (inches)	LT	39.11	38.73	0.75
	OMT	39.65	39.74	
Lower chest exhalation (inches)	LT	37.98	37.41	0.42
	OMT	37.71	37.85	



Chest circumference and speech markers



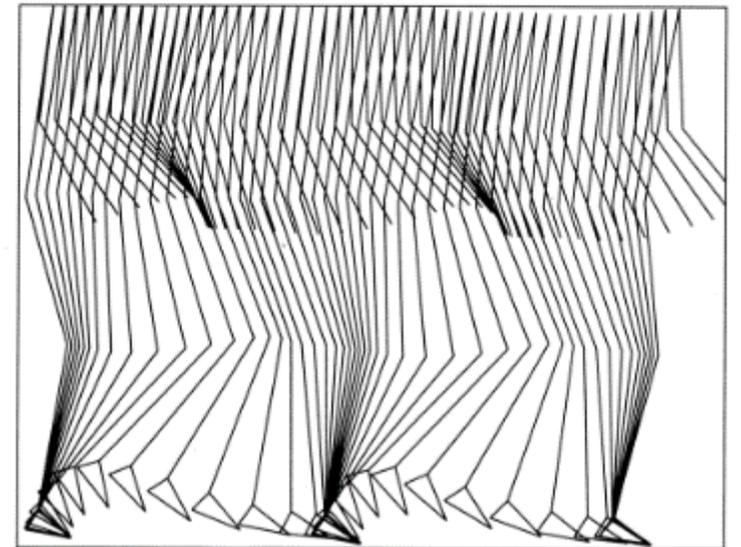
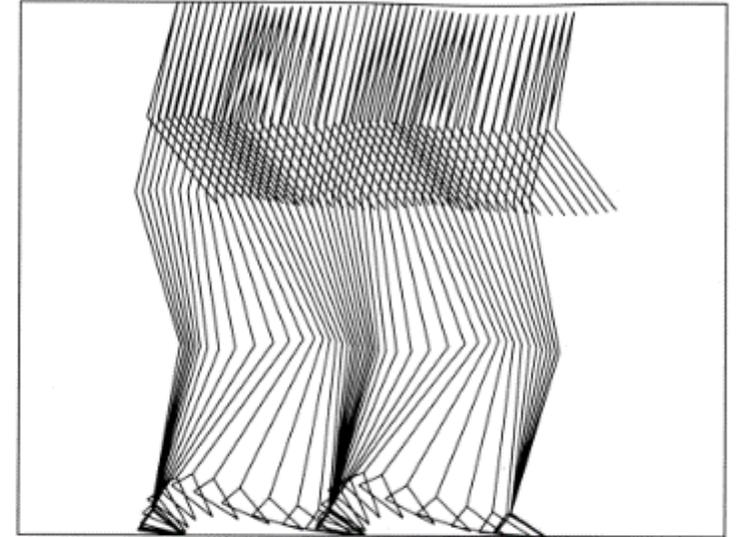
Initial challenges

- Learning about the IRB the hard way
- First studies with OMM and PFT showed no significant change
- Could not get papers published
- Decided to try a different approach and look at balance and motor function instead



Prior Clinical Research

- Standard osteopathic manipulative treatment acutely improves gait performance in patients with Parkinson's disease.
- Wells MR, Giantinoto S, D'Agate D, Areman RD, Fazzini EA, Dowling D, Bosak A.
- J Am Osteopath Assoc. 1999 Feb;99(2):92-8.
- In the treated group of patients with Parkinson's disease, statistically significant increases were observed in stride length, cadence, and the maximum velocities of upper and lower extremities after treatment.



PARK-OMM - Standardize treatment for PD research



PARK-OMM Head and Cervical

1. Suboccipital release
2. Compression of the Fourth Ventricle
3. Supine Cervical Spinal Articulation
4. MET of the cervical spine

PARK-OMM - Standardize treatment for our research study



PARK-OMM Upper Extremities

5. Spencer's Technique of the Shoulder
6. MET of the Radial Head
7. Circumduction of the Wrist

PARK-OMM - Standardize treatment for our research study



PARK-OMM Lower Extremities

8. Sacroiliac Joint Gapping
9. MET of Lower Extremity Adductor Muscles
10. Psoas MET
11. MET of the Hamstring
12. Ankle Articulatory Technique
13. MET to the Plantar and Dorsiflexion muscles of the Ankle

PARK-OMM - Standardize treatment for our research study



PARK-OMM Thoracic/Lumbar

14. Seated Thoracic and Lumbar Spinal Articulation

15. Seated Active Myofascial Stretch to the Thoracic Spine

Turning lemons into lemonade

- Utilized AOA grant comments to redesign study
- 2013 - OMM department chair and built team
 - Dr. Adena Leder, neurologist - specialty in movement disorder
 - Jayme Mancini, DO, PhD, NMM/OMM & FP, PhD in neuroscience
 - Joanne Donoghue, PhD, exercise physiologist with prior grant and publishing experience



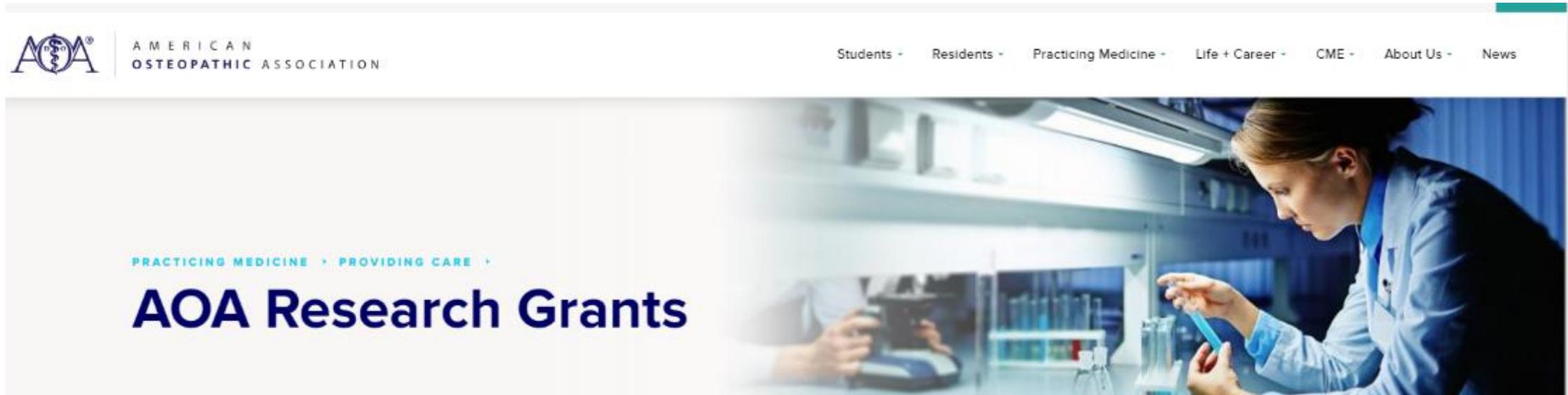
Making Progress

- Team approach to improve study
- Increased visibility of PD and OMM research at NYITCOM
- Encouraged student participation in research

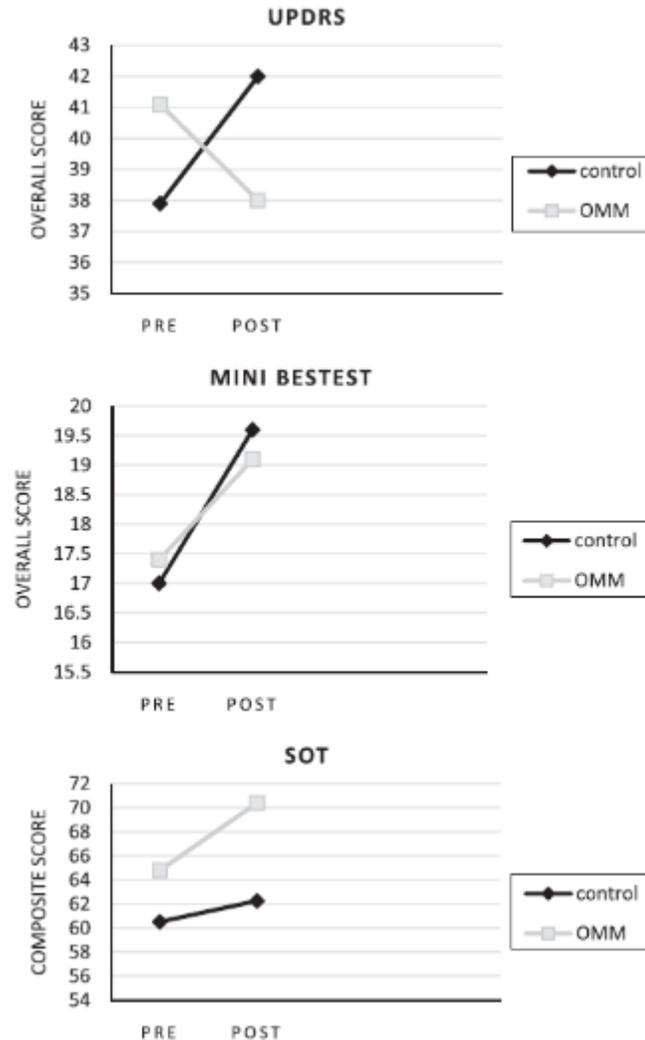


AOA funding 2016

- Utilized comments to redesign the study to have a counseling control arm to account for physician face to face time
- Stopped the crossover arm of the study
- Funding allowed for increased recruitment – targeted 24 subjects in 2 years



The image shows a screenshot of the American Osteopathic Association (AOA) website. The top left corner features the AOA logo and the text "AMERICAN OSTEOPATHIC ASSOCIATION". The top right corner has a navigation menu with links for "Students", "Residents", "Practicing Medicine", "Life + Career", "CME", "About Us", and "News". The main content area is a banner with a background image of a person in a lab coat working in a laboratory. The banner text reads "PRACTICING MEDICINE • PROVIDING CARE •" followed by "AOA Research Grants" in large, bold, blue letters.



NCBI Resources How To

PubMed
US PubMed Library of Medicine
National Institutes of Health

Advanced

Format: Abstract Send to

NeuroRehabilitation. 2016 Oct 31. [Epub ahead of print]

Osteopathic manipulation as a complementary approach to Parkinson's disease: A controlled pilot study.

DiFrancisco-Donoghue J^{1,2}, Apoznanski T³, de Vries K³, Jung MK⁴, Mancini J^{1,2}, Yao S^{1,2}.

Author information

Abstract

BACKGROUND: Osteopathic Manipulative Medicine (OMM) is a therapy of manual forces that is directed to improve function and homeostasis. It has been shown to improve balance in individuals with dizziness, and improve gait in Parkinson's disease (PD). This study was designed to determine if our pre-defined OMM protocol would improve motor function and balance in individuals with PD.

METHODS: A randomized controlled trial to test OMM on balance and motor function in PD measured by the Mini-BESTest, Sensory Organization Test (SOT), and MDS-UPDRS. 11 Subjects (age 75±16) were randomly assigned to either bi-weekly OMM treatments first for 6 weeks or weekly counseling sessions from a medical provider for 6 weeks as a placebo-control. 9 subjects completed this study.

RESULTS: There were no significant changes in SOT or Mini BESTest in either group ($p < 0.05$). There was significant improvement in the OMM group for MDS-UPDRS.

CONCLUSIONS: Our pilot data showed OMM treatment bi-weekly for 6 weeks improved motor function. There were no significant changes in balance, however there were clinically relevant improvements after 6 weeks of OMM. Using a predefined protocol, OMM may be a complementary approach to improving balance and motor function in individuals with PD.

KEYWORDS: Osteopathic medicine; Parkinson's disease; balance; manual manipulation; motor function

PMID: 27814309 DOI: 10.3233/NRE-161400

[PubMed - as supplied by publisher]

f t

Researching possible mechanisms



Progress in Neurobiology

Available online 18 October 2016

In Press, Corrected Proof — Note to users



Review article

Oxidative stress: A major pathogenesis and potential therapeutic target of antioxidative agents in Parkinson's disease and Alzheimer's disease

Tianfang Jiang^a, Qian Sun^a, Shengdi Chen^{a, b}  

^a Department of Neurology, Institute of Neurology and the Collaborative Innovation Center for Brain Science, Rui Jin Hospital Affiliated to Shanghai Jiao Tong University School of Medicine, Shanghai 200025, China

^b Laboratory of Neurodegenerative Diseases, Institute of Health Science, Shanghai Institutes for Biological Sciences, Chinese Academy of Science & Shanghai Jiao Tong University School of Medicine, Shanghai 200025, China



Neurochemistry International

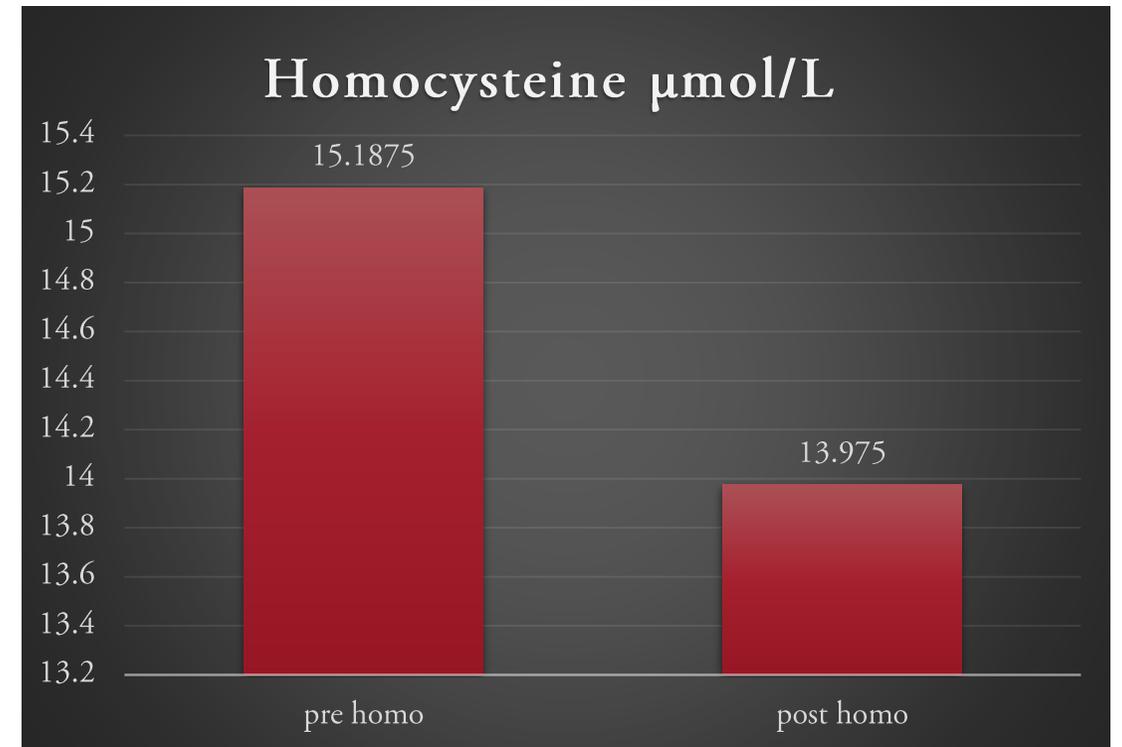
Volume 101, December 2016, Pages 48–55



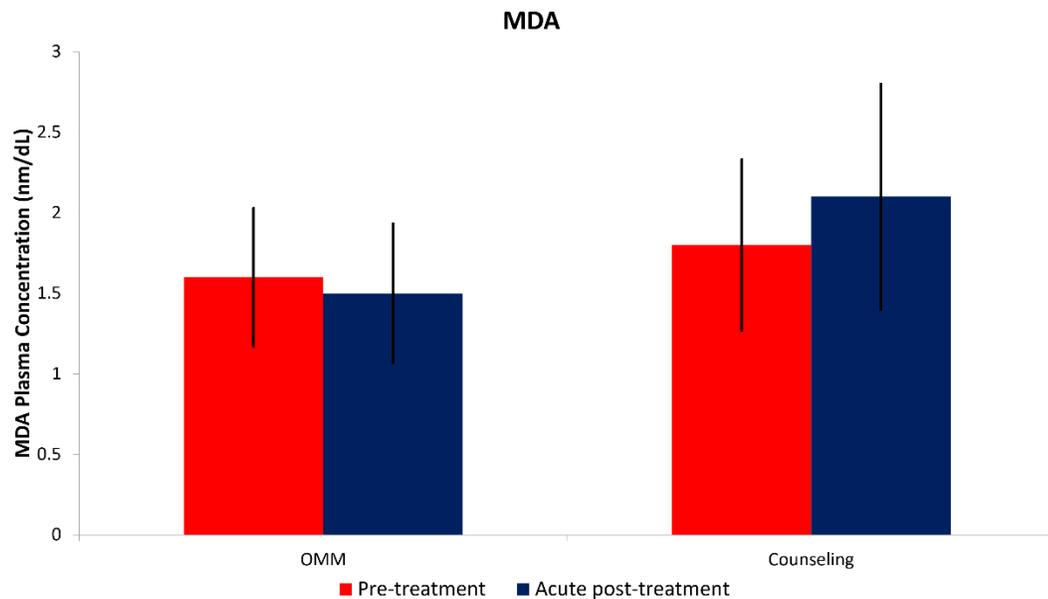
Oxidative stress and mitochondrial dysfunction are the underlying events of dopaminergic neurodegeneration in homocysteine rat model of Parkinson's disease

Nivedita Bhattacharjee, Anupom Borah   

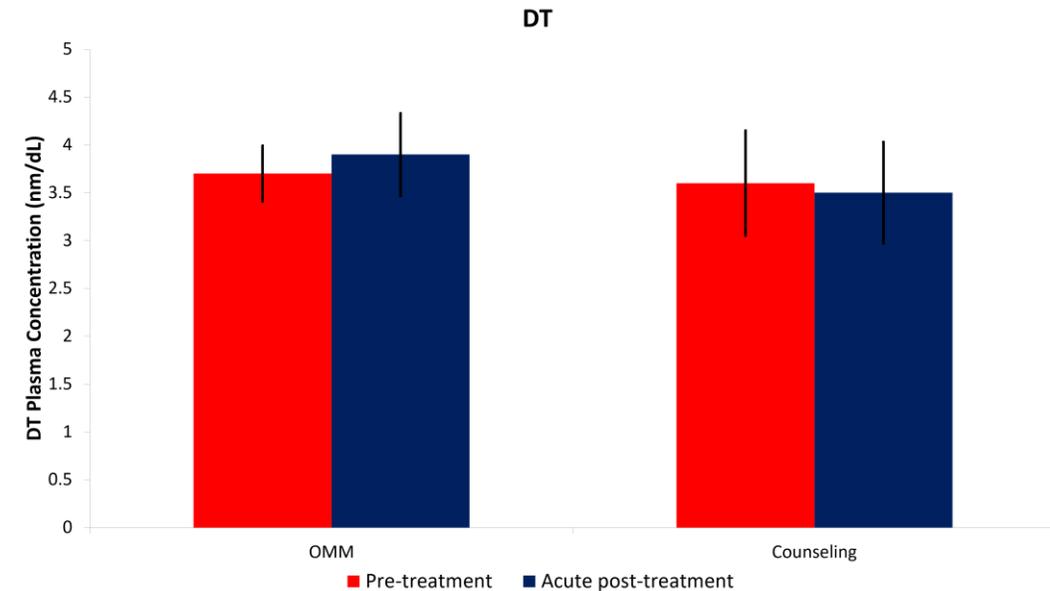
Cellular and Molecular Neurobiology Laboratory, Department of Life Science and Bioinformatics, Assam University, Silchar, Assam, India



Biomarkers results – Acute effects



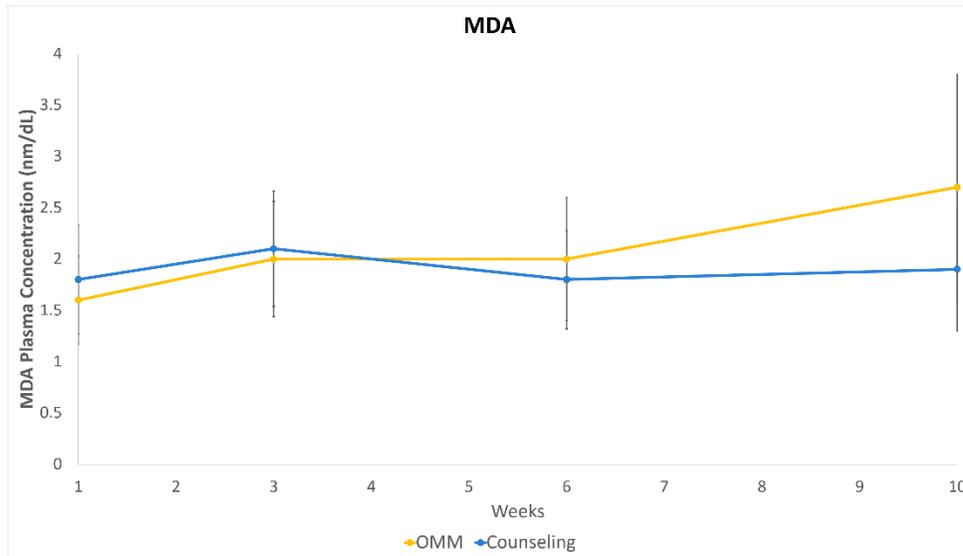
Plasma concentrations of MDA immediately before and after a single intervention. OMM n = 9, Counseling n = 9. p = 0.621.



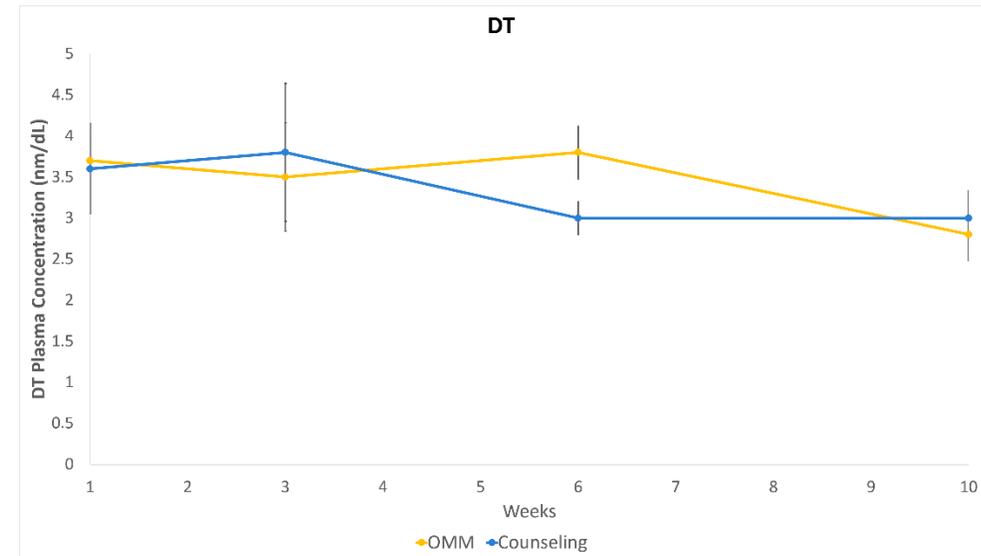
Plasma concentrations of markers of oxidative stress. DT concentrations immediately before and after a single intervention. OMM n = 3, Counseling n = 4. p = 0.512.

- Dityrosine (DT) a cross-linked dimer form of tyrosine, is a stable molecular result of oxidation by ROS
- Malondialdehyde (MDA), is used to demonstrate the effect of free radical oxidation on lipids

Additional biomarkers results – over 6 weeks and 4 weeks wash out



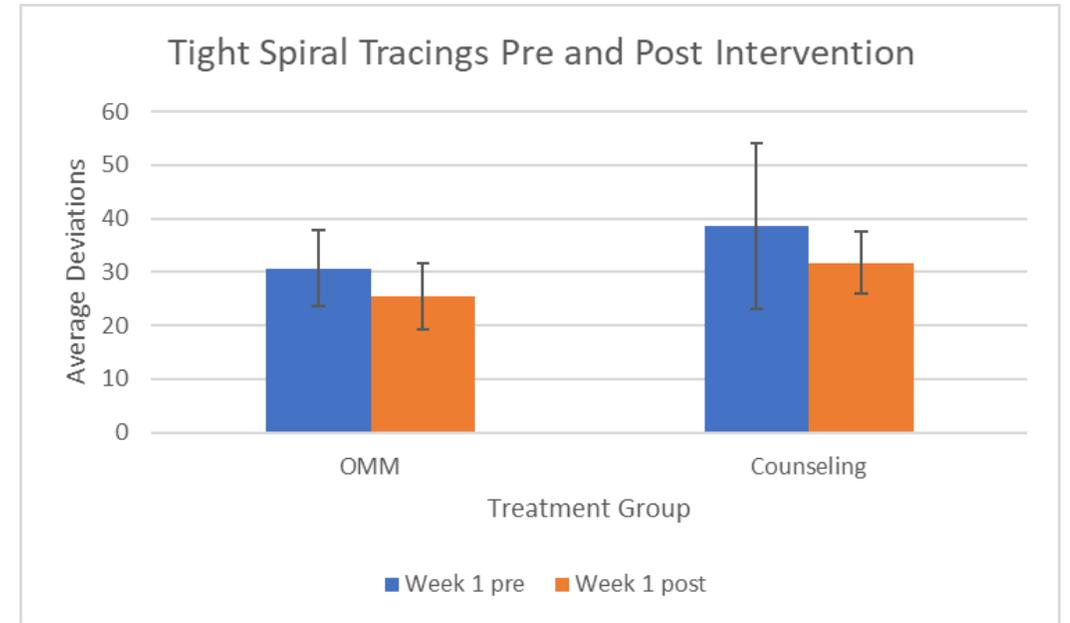
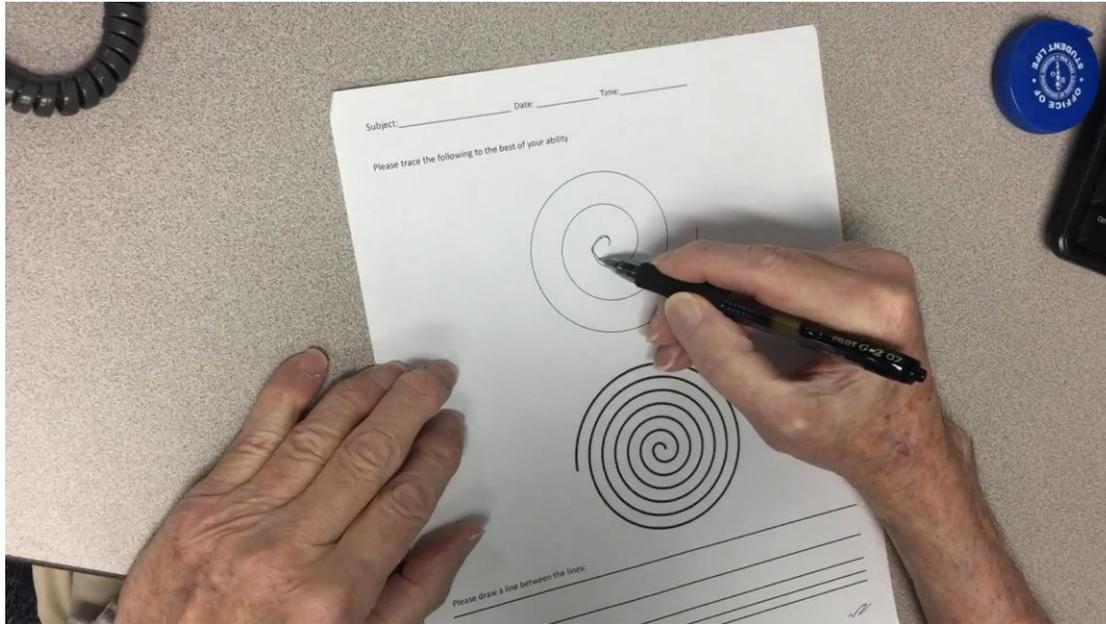
Plasma concentrations of markers of MDA concentrations over 10 weeks. OMM n = 10, Counseling n = 9. p = 0.536.



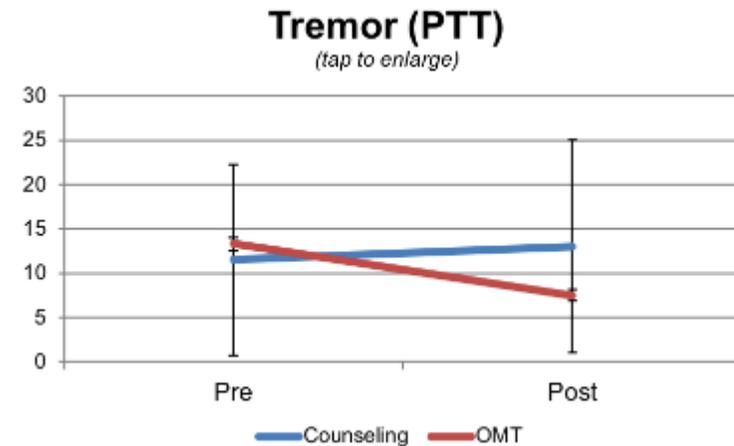
Plasma concentrations of markers of oxidative stress. DT concentrations over 10 weeks. OMM n = 3, Counseling n = 4. p = 0.18

- Dityrosine (DT) a cross-linked dimer form of tyrosine, is a stable molecular result of oxidation by ROS
- Malondialdehyde (MDA), is used to demonstrate the effect of free radical oxidation on lipids

Additional research tools – Measuring tremors



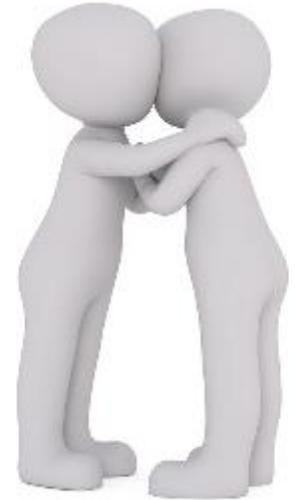
Additional research tools – Measuring tremors



Utilizing the Parkinson's KinetiGraph™ system (PKG™ system, Global Kinetics), PD subjects wore the watch for 6 days pre and post 6-weeks of counseling (n=2) and OMM arms (n=2). There was a noted decrease in PTT found in the OMT group, while not statistically significant, may be clinically significant ($p = 0.055$).

Lessons Learned

- Osteopathic research is a challenging endeavor.
- Learn the steps and processes required to conduct research.
- Understand the many confounding factors involved with studying Osteopathic medicine.
- Develop a team approach and seek supportive mentorship.
- New technologies many help to better measure the effects of OMT.



Lessons Learned

- Learn from failures, persevere through challenges.
- Osteopathic research is difficult. The osteopathic approach is a philosophy and the distinctiveness of what makes us a DO cannot be studied as just a bunch of techniques.
- More research is needed to further the science and understanding of OMM.
- “D.O. means to dig on” – A.T. Still



