

# Tai Chi: A Mind-body Exercise for Pain Relief and Well-being

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A photograph of a person's back being massaged by another person's hands. The word 'PAIN' is written in large, bold, red letters across the lower back. The background is dark, and the overall tone is somber and focused on the theme of pain.

**TIME**

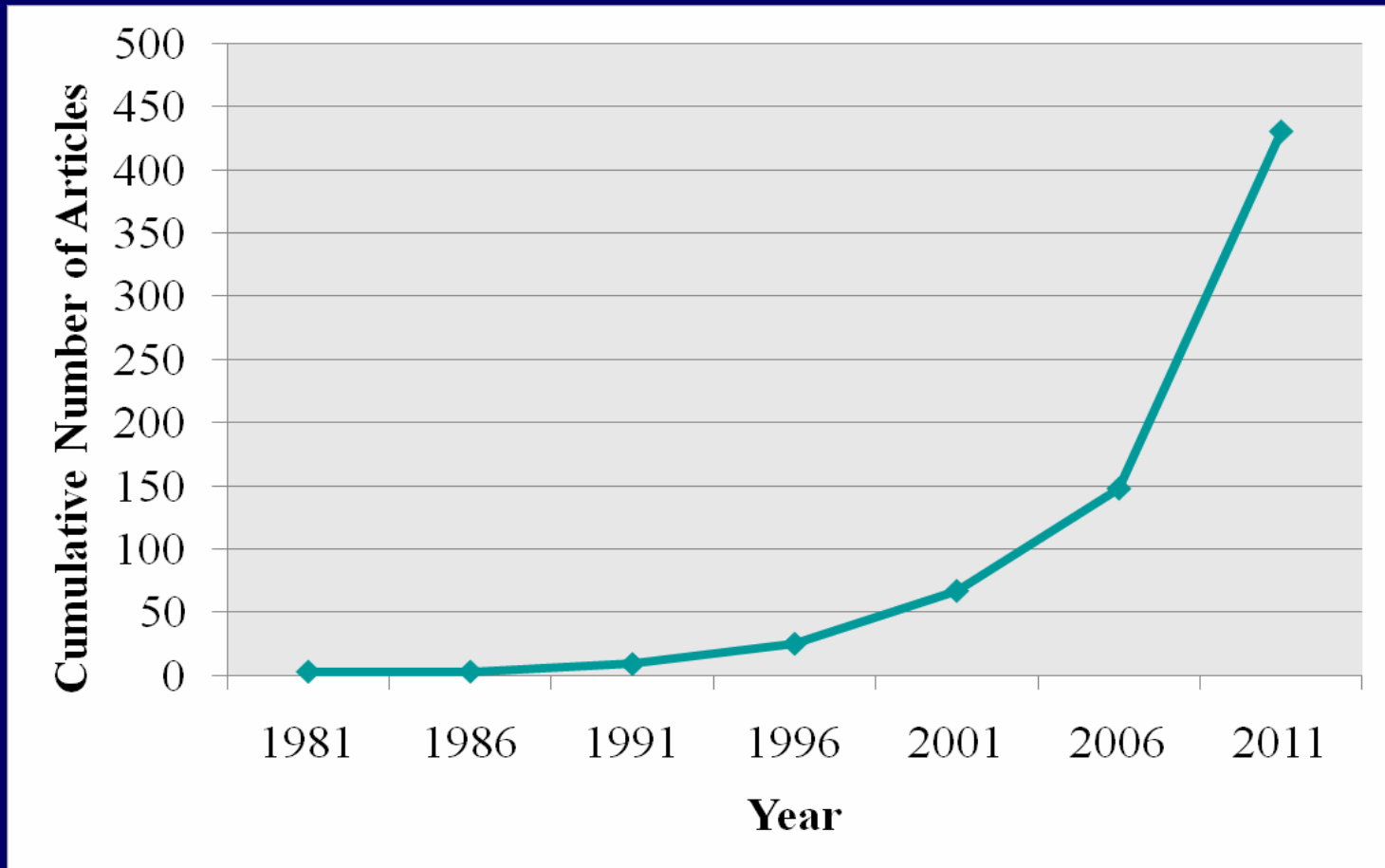
**“Beyond Drugs:  
How Alternative  
Treatments Can  
Ease Pain”**

**UNDERSTANDING  
PAIN**

# National Health Interview Survey (n = 31,044) Complementary and Alternative Medicine Use Among Adults and Children: United States, 2007

- Around **2.5 million** Americans practice Tai Chi and the number is rapidly increasing.
- Tai Chi use was associated with higher reports of musculoskeletal conditions (OR 1.43, 95% CI 1.11-1.83).

# Growth of Tai Chi Literature



**Currently, there are 460 citations for Tai Chi research.**

# Selected Tai Chi Publications

- 1. Wang C, Schmid C, Kalish R, et al. A Randomized Controlled Trial of Tai Chi for Fibromyalgia. New England Journal of Medicine, 2010; 363: 743-54.
- 2. Wang C, Schmid C, Hibberd P, et al. Tai Chi is Effective in Treating Knee Osteoarthritis: A Randomized Controlled Trial. Arthritis & Rheum. 2009; 61: 1545-1553.
- 3. Wang C, Roubenoff R, Lau J, Effect of Tai Chi in adults with Rheumatoid Arthritis. Rheumatol. 2005; 44: 685-687.
- 4. Wang C. Tai Chi and rheumatic diseases. Rheumatic disease clinics of North America. 2011; 37: 19-32.
- 5. Wang C, Ramel, J, Schmid C. Tai Chi and Psychological wellbeing. BMC Complementary and Alternative Medicine, 2010; 10: 23: 1186-1472.
- 6. Wang C, Collet J, Lau J. The effect of Tai Chi on health outcomes in patients with chronic conditions: a systematic review. Archives of Internal Medicine. 2004; 164: 493-501. PMID: PMC15006825.
- 7. Yeh GY, Wang, C, Wayne P, Phillips R Tai Chi Exercise for Patients with Cardiovascular Conditions and Risk Factors, A Systematic Review. J Cardiopulm Rehab Prev. 2009, 29:152-60.
- 8. Yeh GY, Wang C, Wayne PM, Phillips RS. The Effect of Tai Chi Exercise on Blood Pressure: A Systematic Review. Prev Cardiology 2008; 11: 82-89.

# Outline

- Overview of fibromyalgia and Tai Chi
- A randomized trial of Tai Chi for fibromyalgia
- Conclusion and clinical implications

# Case Vignette (the New York Times)

Mary, 59, from Lynn, Mass.

“It hurt me so much just to put my hands over my head.”

“Sleeping was difficult”.

“I couldn’t walk half a mile.”

“There was no joy to life.”

“I was an entire mess from head to foot.”

PE: Multiple tender points; depressed

Mary rejected medication due to side effects.

She tried physical therapy, swimming and other approaches.

# Fibromyalgia Syndrome

- A common and complex Pain illness
- The second most common condition seen in rheumatologic practice in the US
- Very difficult to treat

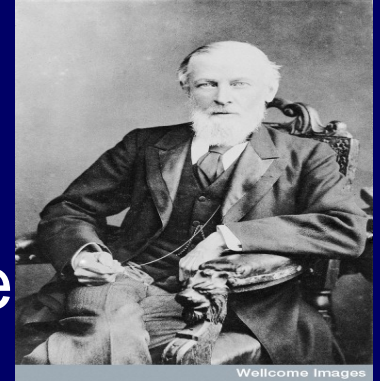


# Pharmacological Treatment of Fibromyalgia

- Analgesics
- Antidepressants
- Antiseizure drugs

Most of these treatments have modest efficacy when used as stand-alone therapy.

# History of Fibromyalgia



## Early 20<sup>th</sup> Century:

- Fibrositis- inflammation of fibrous tissue of muscles

## Mid-1970s: termed fibromyalgia

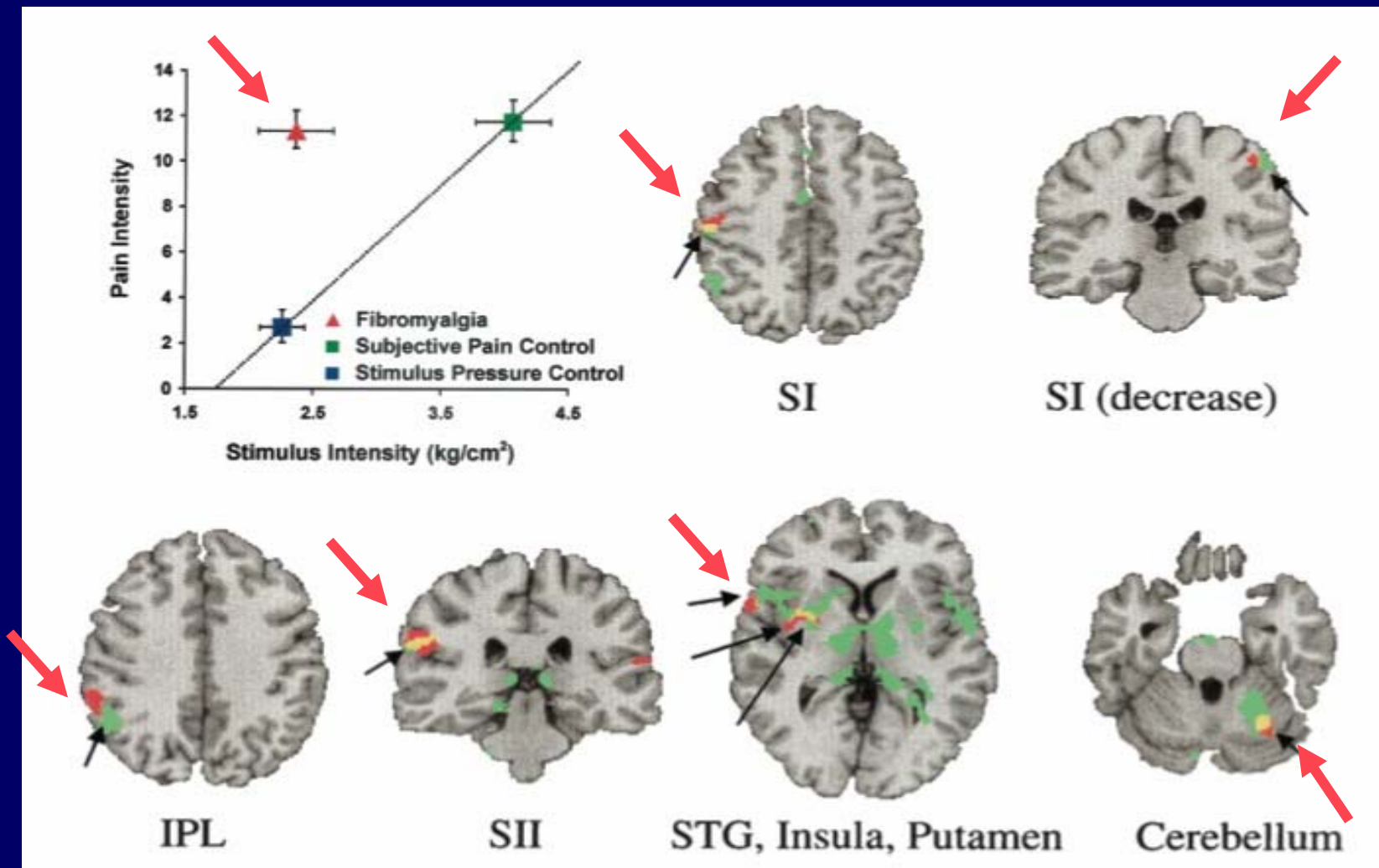
- Muscle biopsy “abnormalities” found no different from deconditioned controls

**Mid-1980s:** a classified as disorder of the central nervous system

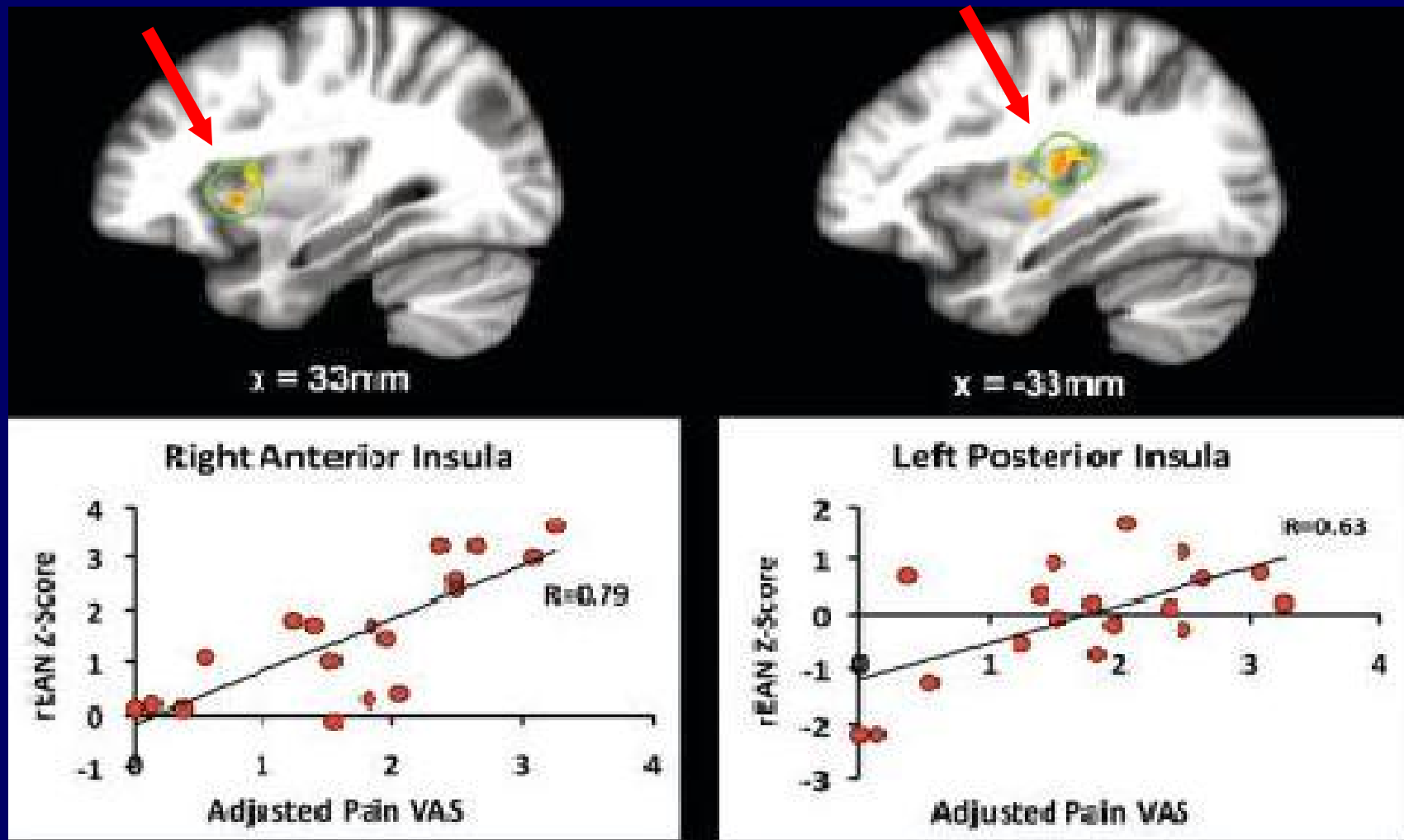
# **Pathophysiology- Current Theories**

**Central Nerve System pain deregulations**

# Brain Regional Blood Flow Response to Pain in Fibromyalgia vs Controls



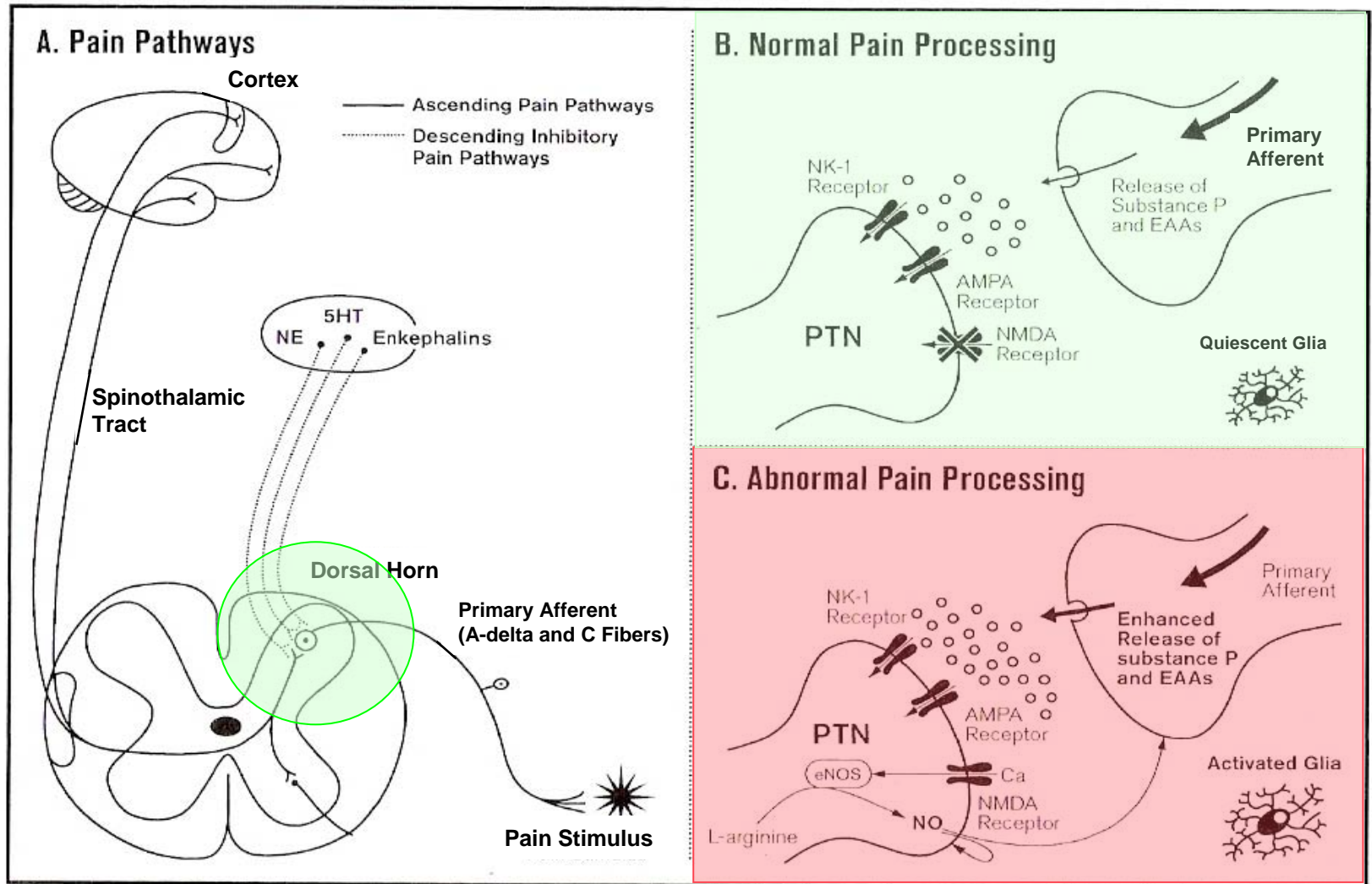
# Pain Intensity correlated with executive attention network connectivity to the insula



# Summary of Brain Imaging Results

- Brain function or activity changes in patients with FM.
- Pain associated with FM may be mediated by central nervous system hyper-excitability.
- Brain activity within multiple networks is associated with spontaneous clinical pain.

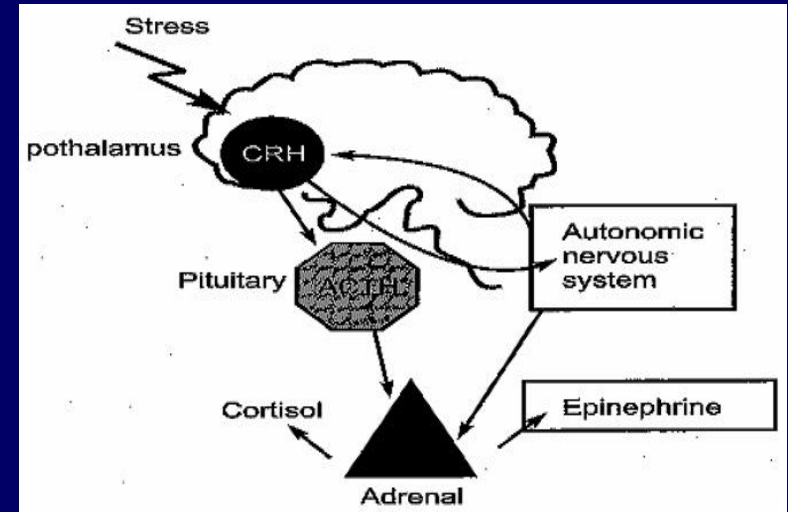
# Abnormal Pain Processing in Fibromyalgia



# Pathophysiology – Current Theories

## Stress-related disorder

- Abnormalities in the Hypothalamic-pituitary-adrenal axis

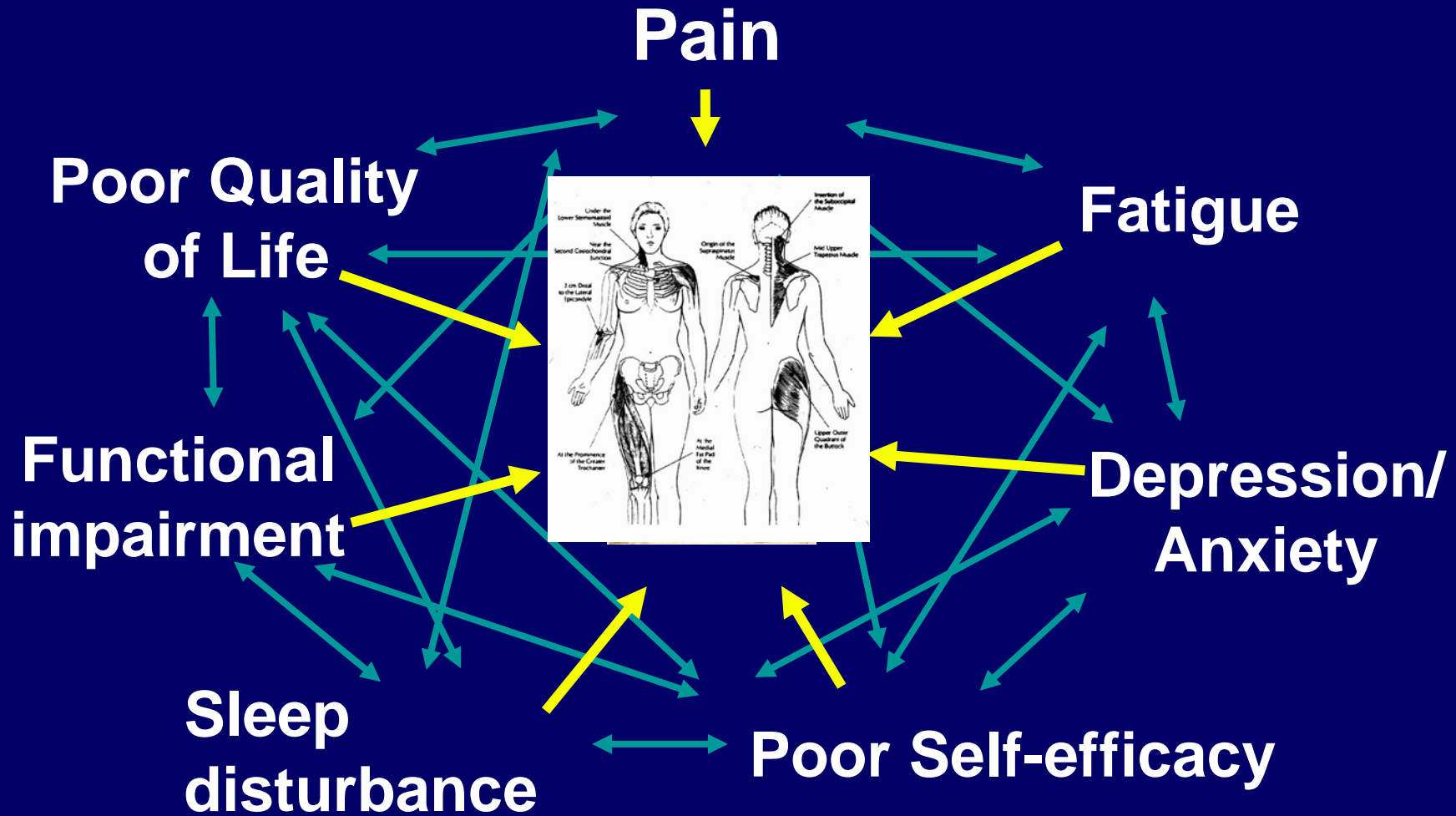


## Neurotransmitter deficiency

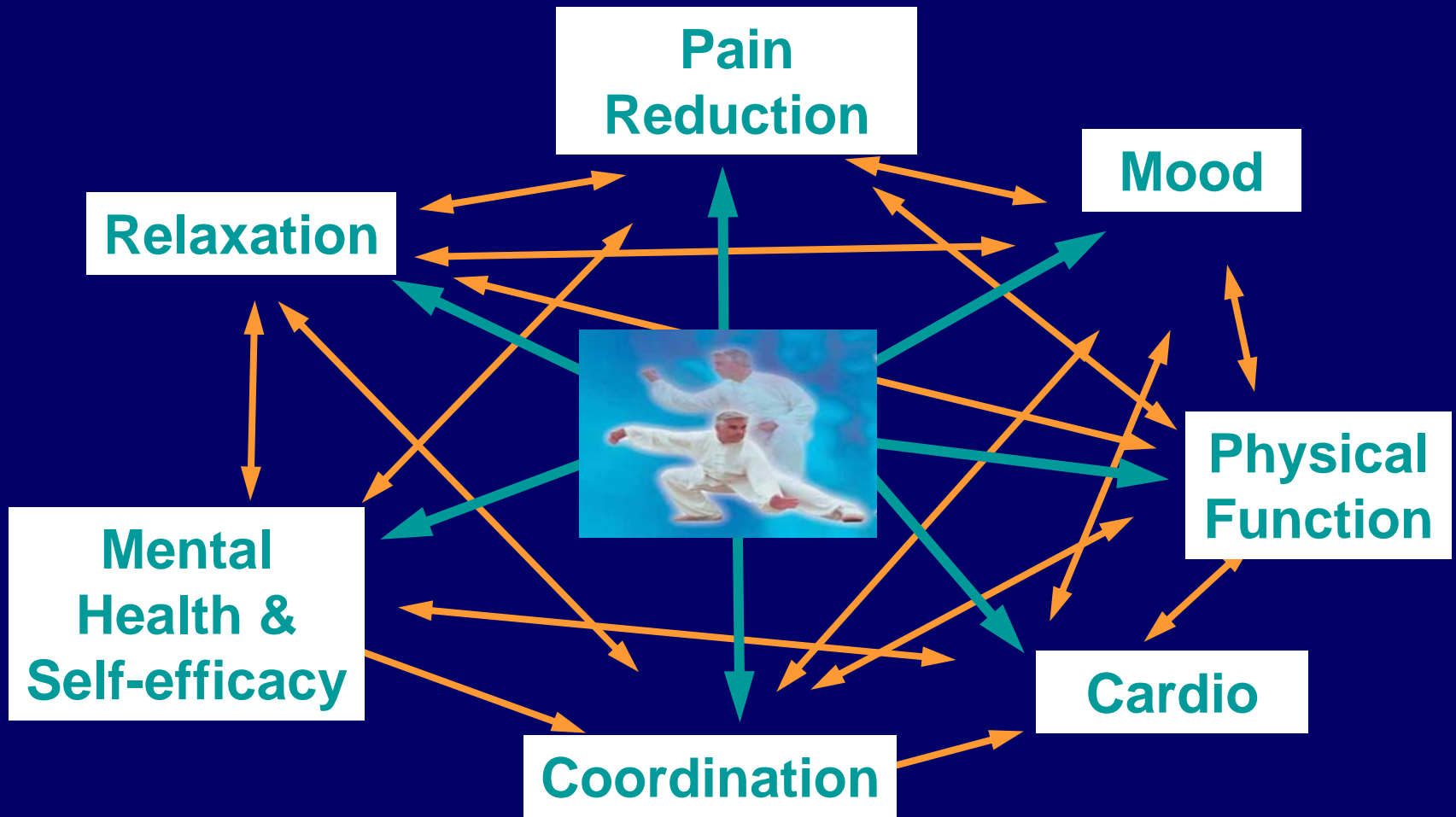
- Low level of serotonin, norepinephrine, and dopamine metabolites in blood and cerebrospinal fluid



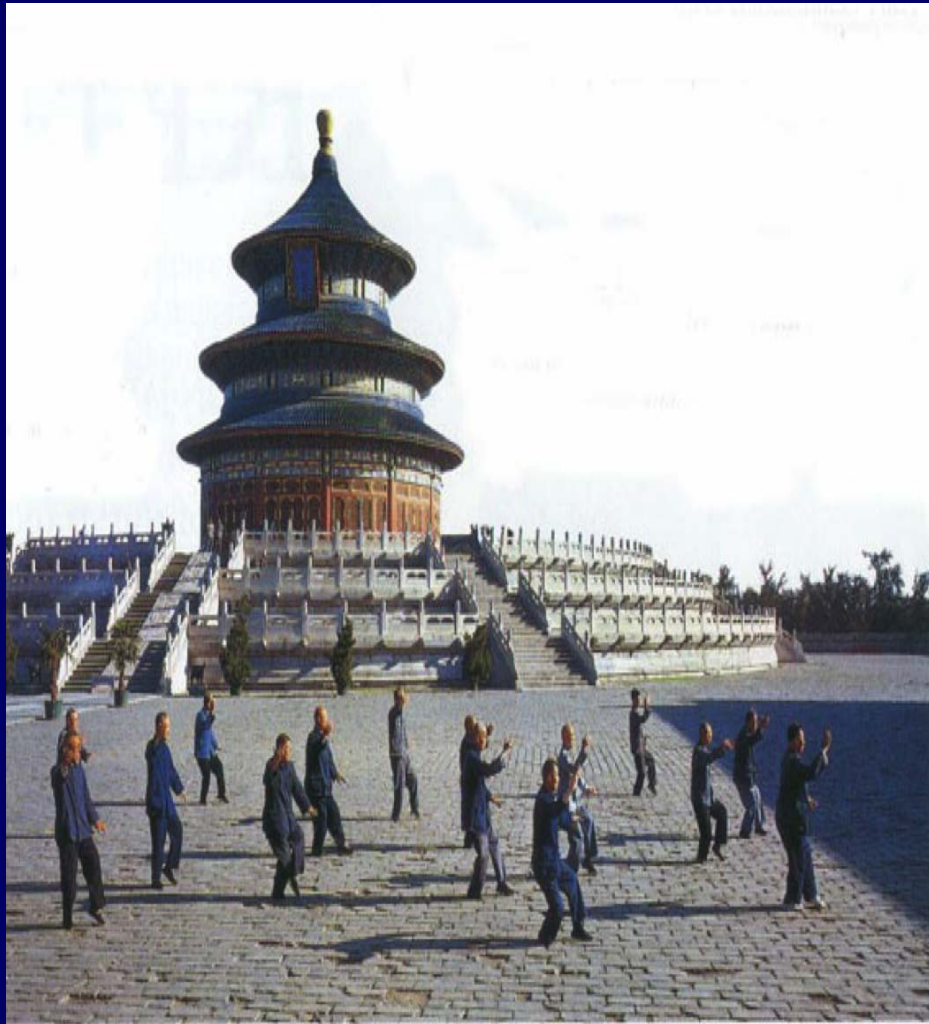
# Physical and Psychological Change in Chronic Pain



# Tai Chi Mind-body Benefits for Chronic Pain



# What is Tai Chi ?



A traditional Chinese martial art. Tai Chi combines meditation with slow, gentle, graceful movements, deep breathing and relaxation<sup>1</sup>

Interactions between the brain, mind, body, and behavior<sup>1</sup>

Physiological and psychosocial benefits for patients with chronic conditions<sup>2</sup>

1. Delza, S. Rev. ed. State University of New York Press Albany, N.Y., 1985.
2. Wang C et al. Archives of Internal Medicine. 2004;164: 493-501

# The Effect of Tai Chi on Health Outcomes in Patients With Chronic Conditions

## *A Systematic Review*

Chenchen Wang, MD, MSc; Jean Paul Collet, MD, PhD; Joseph Lau, MD

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- 47 studies including randomized controlled trials, non-randomized studies, and observational studies published in English or Chinese.
- Benefits were reported for balance and strength, cardiovascular and respiratory function, symptoms of arthritis, muscular strength and psychological well-being.
- Additional well-designed studies are needed.

**RESEARCH ARTICLE**

**Open Access**

# Tai Chi on psychological well-being: systematic review and meta-analysis

Chenchen Wang\*<sup>1</sup>, Raveendhara Bannuru<sup>1</sup>, Judith Ramel<sup>1</sup>, Bruce Kupelnick<sup>1</sup>, Tammy Scott<sup>2</sup> and Christopher H Schmid<sup>2</sup>

- **8 English and 3 Chinese databases were searched through March 2009.**
- **40 studies, totaling 3817 subjects, reported at least 1 psychological health outcome.**
- **The trials in each subcategory were meta-analyzed using a random-effects model.**
- **Tai Chi significantly improved psychological well-being.**

# Tai Chi: An Overview

- 35 reviews published between 2002 and 2010 were analyzed.
- The evidence is convincingly positive for fall prevention, improved balance, and improved psychological health.

*Lee and Ernst, BJSM, 2011; 1-6*

ORIGINAL ARTICLE

# A Randomized Trial of Tai Chi for Fibromyalgia

Chenchen Wang, M.D., M.P.H., Christopher H. Schmid, Ph.D., Ramel Rones, B.S.,  
Robert Kalish, M.D., Janeth Vinh, M.D., Don L. Goldenberg, M.D.,  
Yoojin Lee, M.S., and Timothy McAlindon, M.D., M.P.H.

## ***Study Aims***

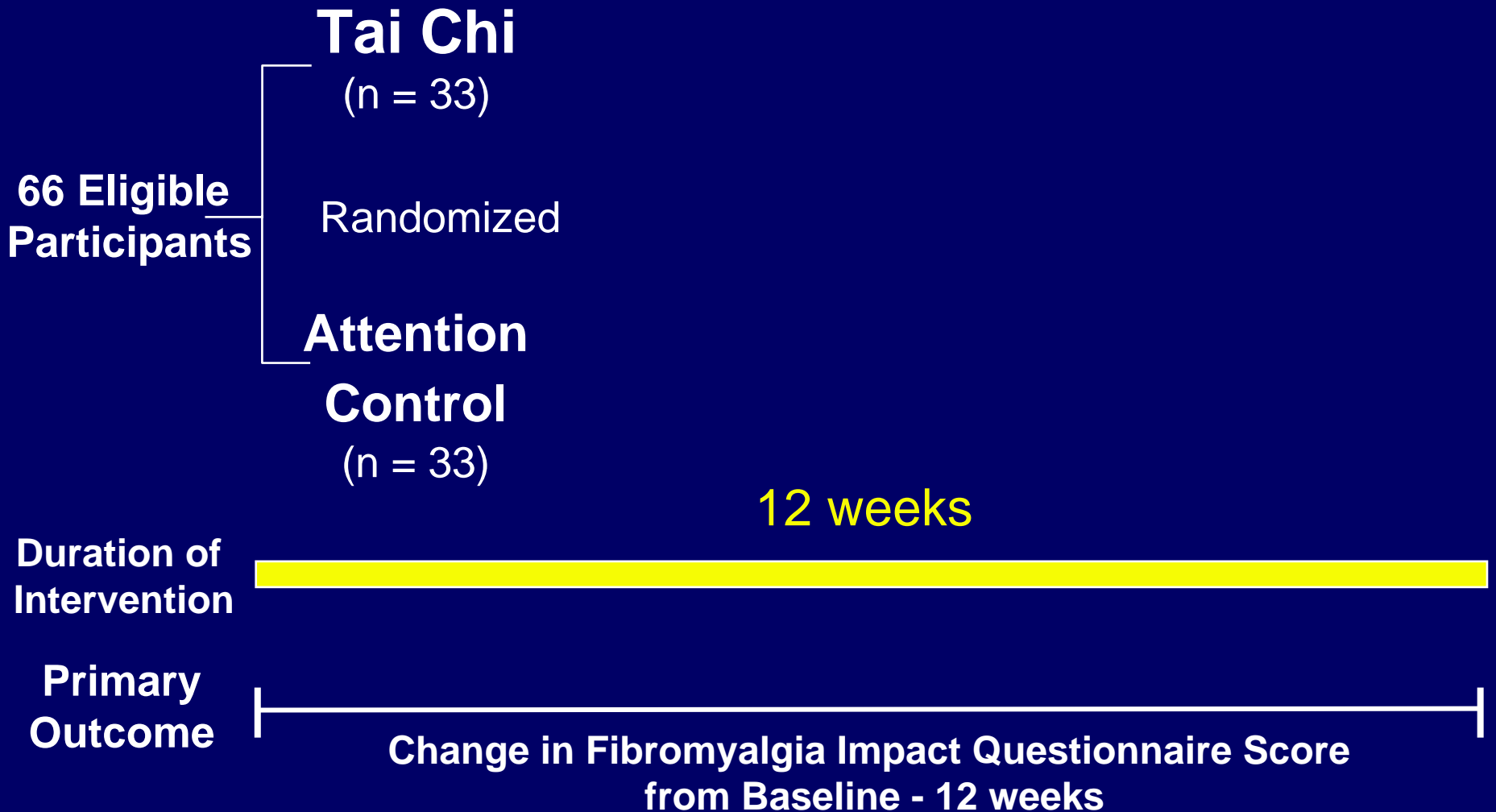
Explore the effects of Tai Chi on musculoskeletal pain, sleep quality, psychological distress, functional impairment and health status in patients with fibromyalgia.

# Inclusion Criteria

- **Age 21 or older**
- **American College of Rheumatology criteria for classifying fibromyalgia (1990)**
  - **History of widespread pain >3 months**
  - **Tender point sensitivity**



# Study Design



# Primary Outcome Measure

## Fibromyalgia Impact Questionnaire (FIQ)

- a validated multidimensional measure for participant-rated overall severity of Fibromyalgia.
- includes intensity of pain, physical functioning, fatigue, morning tiredness, stiffness, depression, anxiety, job difficulty and overall well-being.
- The total score ranges between 0 and 100 with higher scores indicating more severe symptoms.

# Tai Chi - Intervention

- **Classical Yang style Tai Chi**
- **1 hour, 2 x /week (12 weeks)**
- **Every session included:**
  - 1) Warm up and review Tai Chi principles**
  - 2) Meditation with Tai Chi movement**
  - 3) Breathing technique**
  - 4) Relaxation**

# Attention Control (Stretching and Wellness Education)

- 1 hour, 2 x /week (12 weeks)
- Sessions include

## *Education*

- FM knowledge
- Diet and nutrition
- Physical and mental health

## *Stretching exercise*

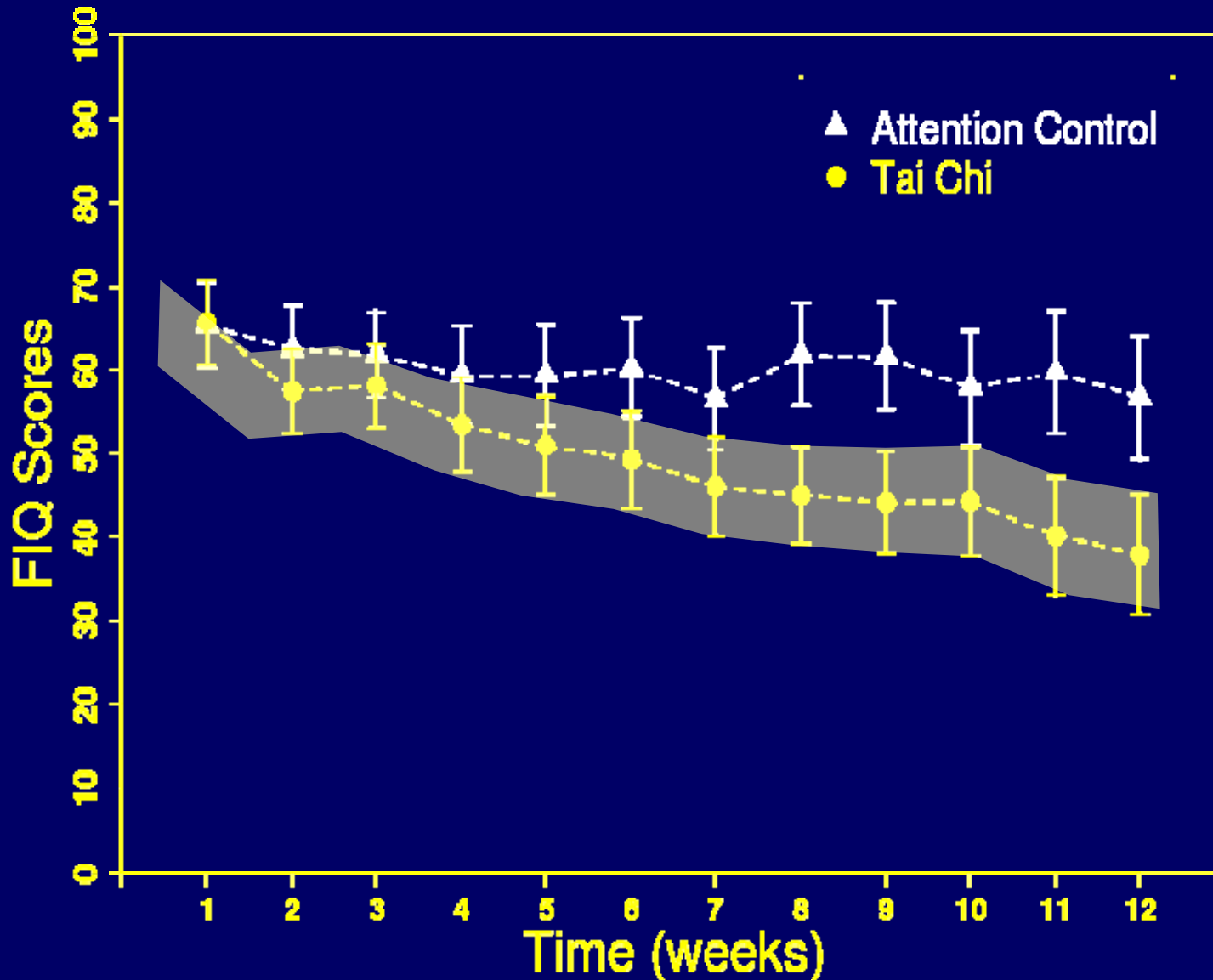
# Results

- **92 % of participants completed the study**
- **Attendance:**
  - 77% (Tai Chi)
  - 70% (Attention control)

# Baseline Characteristics (N=66)

	Tai Chi (n=33)	Control (n=33)
Age (year)	50	51
Female	85%	88%
White	61%	52%
Body Mass Index	34	32
Duration of Pain (yr)	11	10
FIQ, (0-100mm)	63	68
Physician global, (0-10cm)	6	6
Patient global, (0-10cm)	6	6
<b>SF-36, PCS, (0-100)</b>	<b>29</b>	<b>28</b>
Outcome expectation (1-5)	3.7	3.9

# Mean weekly Fibromyalgia Impact Questionnaire Scores



Control  
-10.2  
(-16.6, -3.7)

**P = 0.0001**

Tai Chi  
-28.5  
(-34.7, -22.3)

# 12 Week Changes in Secondary Outcomes

	Tai Chi (n=33)	Control (n=33)	P Value*
<b>Sleep Quality Score</b> (0-21)	<b>3.6</b>	<b>0.7</b>	<b>0.001</b>
<b>Patient Global Assessment Score</b> (0-10 cm)	<b>2.5</b>	<b>0.6</b>	<b>0.002</b>
<b>Physician Global Assessment Score</b> (0-10 cm)	<b>1.0</b>	<b>0.02</b>	<b>0.02</b>
<b>6 Minute Walk Test</b>	<b>60.6</b>	<b>16.3</b>	<b>0.007</b>

\*Adjusted means difference were compared by including interaction of time and group in mixed model

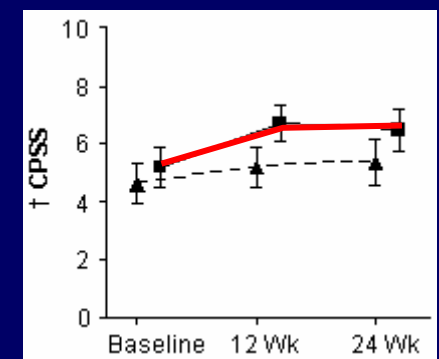
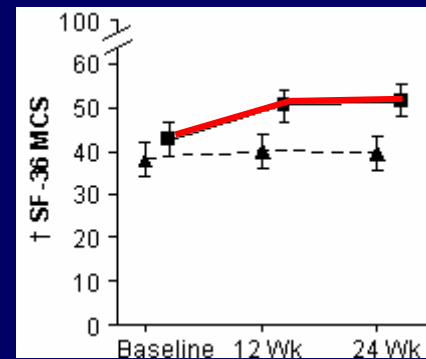
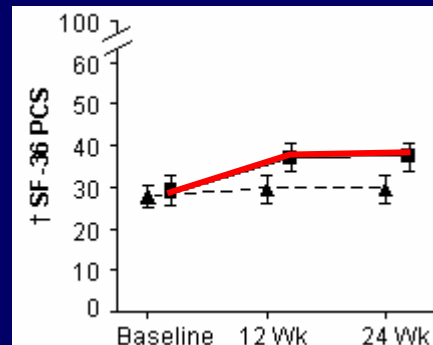
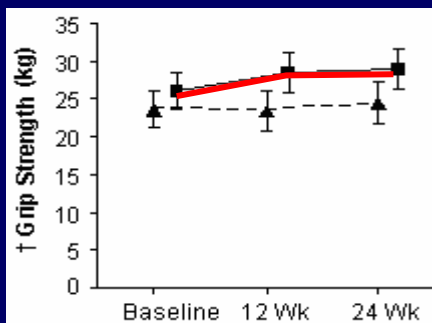
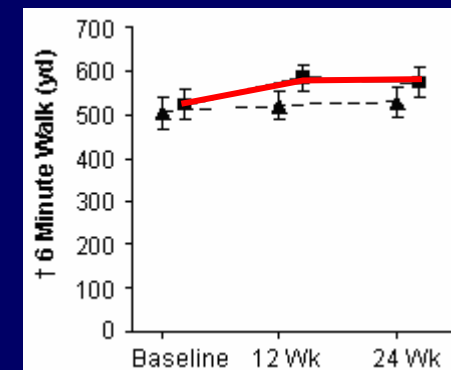
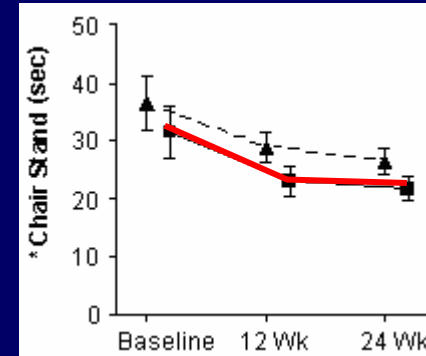
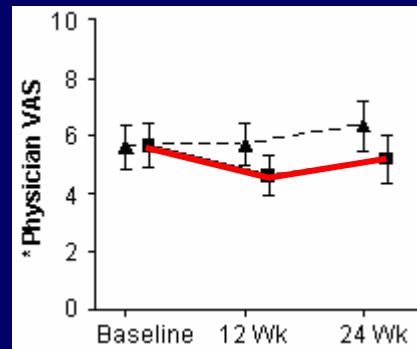
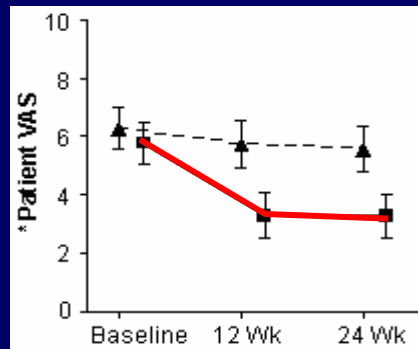
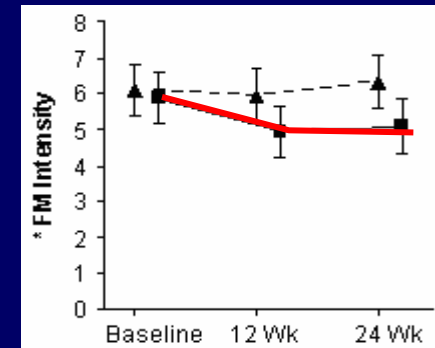
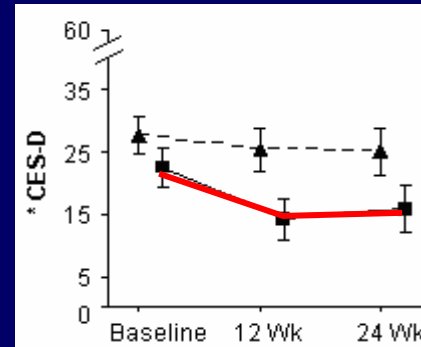
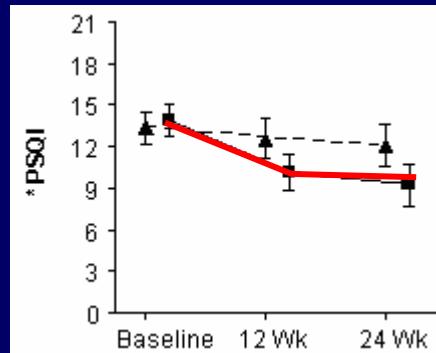
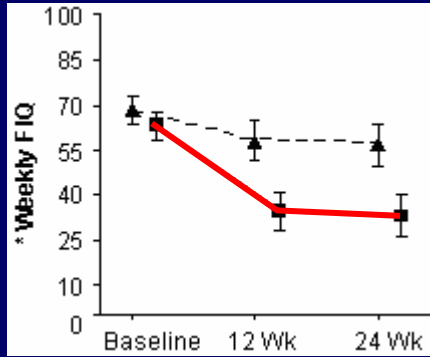


# 12 Week Changes in Secondary Outcomes

	Tai Chi (n=33)	Control (n=33)	P Value*
<b>SF-36, Physical Component Summary</b> (0-100)	<b>8.5</b>	<b>1.4</b>	<b>0.001</b>
<b>SF-36, Mental Component Summary</b> (0-100)	<b>7.7</b>	<b>1.6</b>	<b>0.03</b>
<b>CES-Depression Score</b> (0-60)	<b>8.1</b>	<b>2.3</b>	<b>0.005</b>
<b>Self-efficacy Score</b> (1-10)	<b>1.5</b>	<b>0.5</b>	<b>0.06</b>

\*Adjusted means difference were compared by including interaction of time and group in mixed model

# Improvements in Secondary Outcomes



Tai Chi ————— Control - - - - -

\***FIQ**= Fibromyalgia Impact Questionnaire, **PSQI**= Pittsburgh Sleep Quality Index, **CES-D**= Center for Epidemiology Studies Depression Index, **VAS**= Visual Analogue Scale, SF-36= Short-Form health survey, **PCS**= Physical Component Summary, **MCS**= Mental Component Summary, **CPSS**= Chronic Pain Self-Efficacy Scale.

# Medication Use

- More subjects discontinued medication to treat FM in the Tai Chi group than in the control group

[(Tai Chi group 11/31 (35%) vs. controls 4/26 (15%),  
P=0.09]

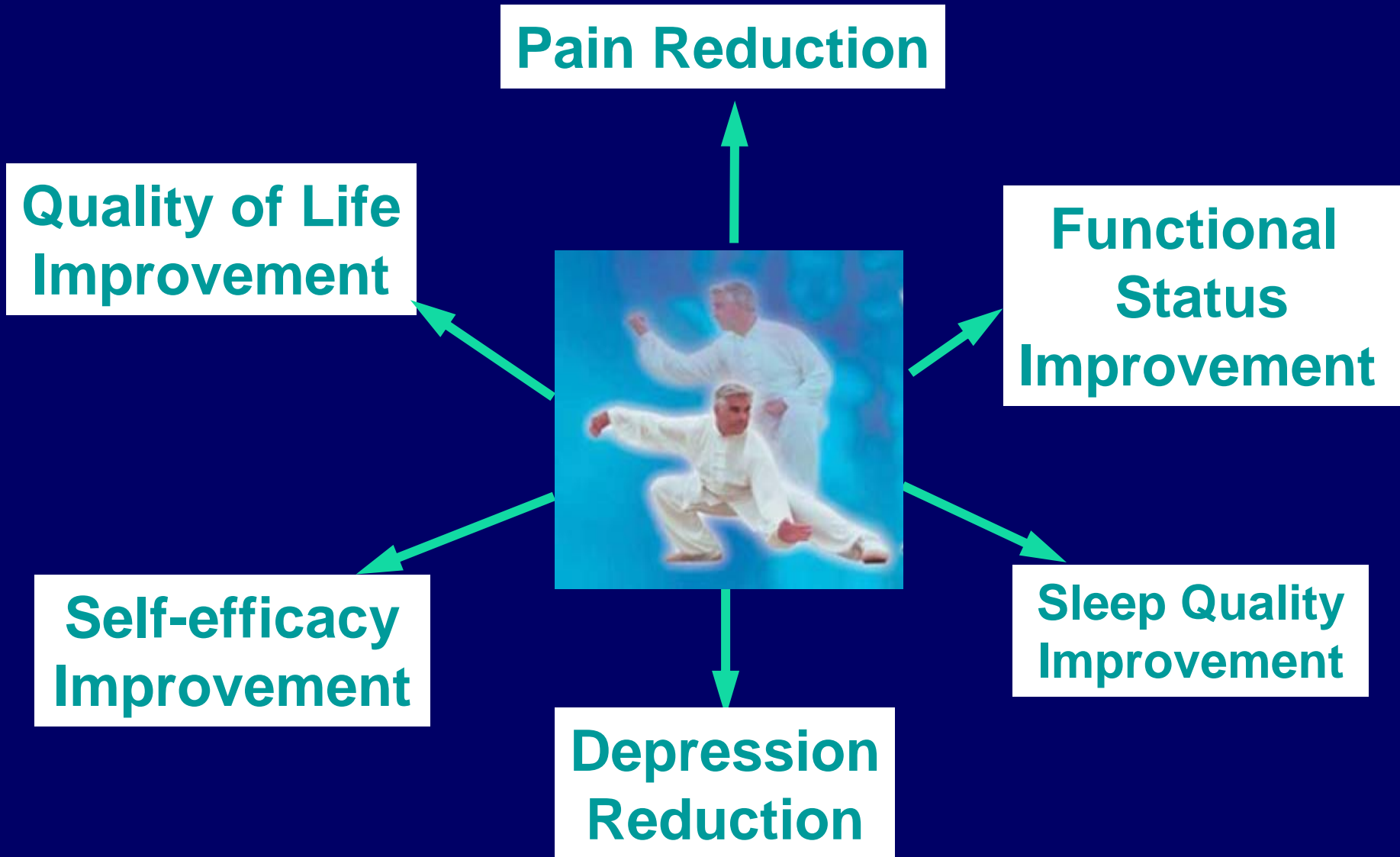
# Mary (6 months follow up)

- Continues to practice Tai Chi (5 classes/wk, practice at home)
- Pain relief from fibromyalgia related areas
- More flexibility, range of motion, and strength
- Improved energy
- No headaches in last 2 months
- Anxiety is no longer a problem
- Improved and restful sleep (6-7 hours)
- More positive attitude
- Pain medications reduced: Advil (<1/week)



*“My PCP at Lahey Clinic for 7+years is so impressed with my improved condition, on all levels, that she asked me to share this Tai Chi experience with her other Fibromyalgia patients. “*

# Conclusions



# Tai Chi: Clinical Implications

- Safe and enjoyable exercise with high adherence
- Effective for treatment of chronic pain
- Improves physical function, sleep quality, depression, and quality of life in people with chronic pain syndrome
- Qualified instructors with healing experience are essential