



Memorial Sloan Kettering  
Cancer Center

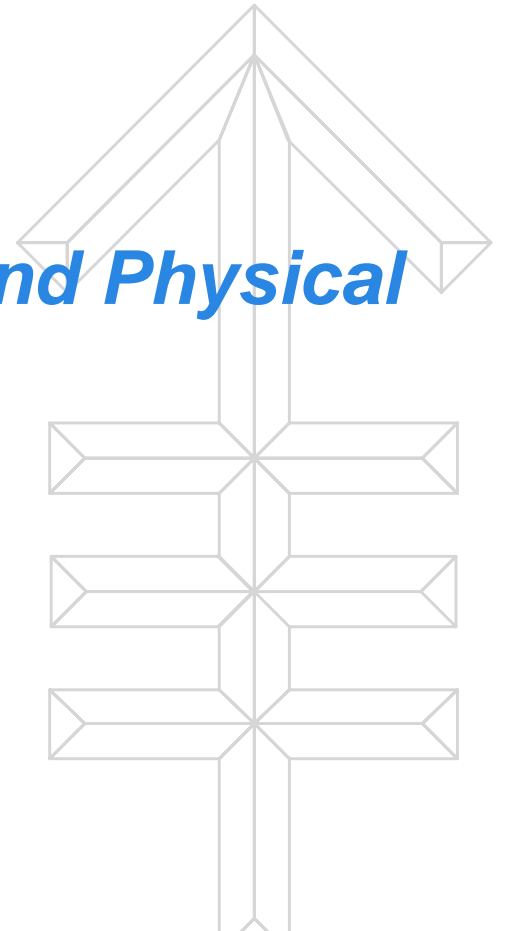
ZERO Us TOO New York | March 20, 2025

## **Integrative Medicine**

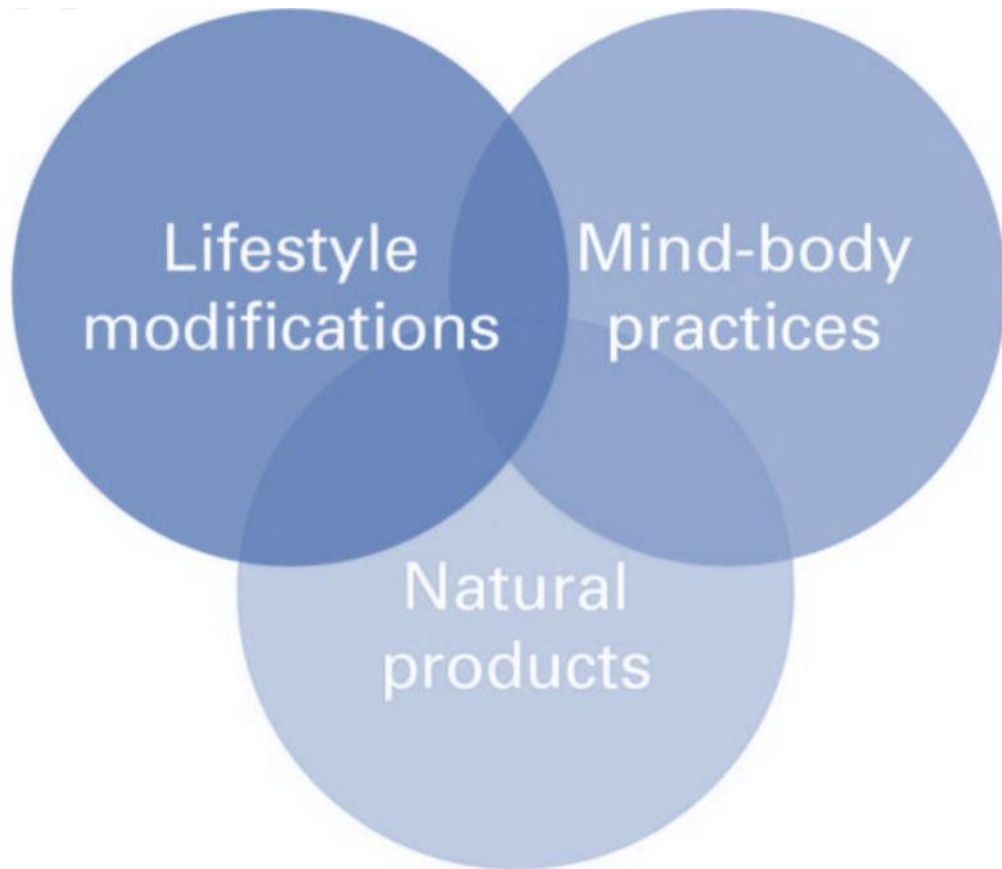
*Science-Backed Approaches to Promote Mental and Physical Wellbeing during the Prostate Cancer Journey*

**Kevin T. Liou, MD**

Director, Integrative Medicine Fellowship Program  
Memorial Sloan Kettering Cancer Center



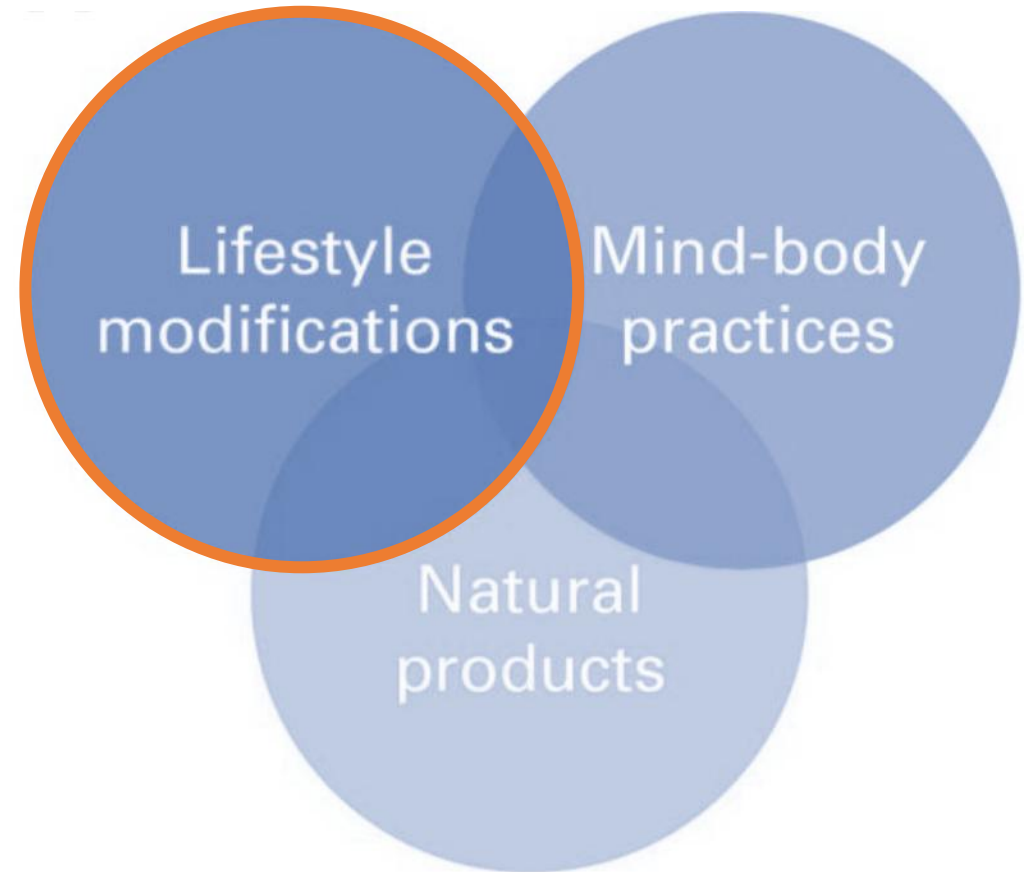
**Integrative oncology** is a patient-centered field that uses **evidence-informed modalities** from different healing traditions, alongside conventional cancer treatments, **to optimize health.**



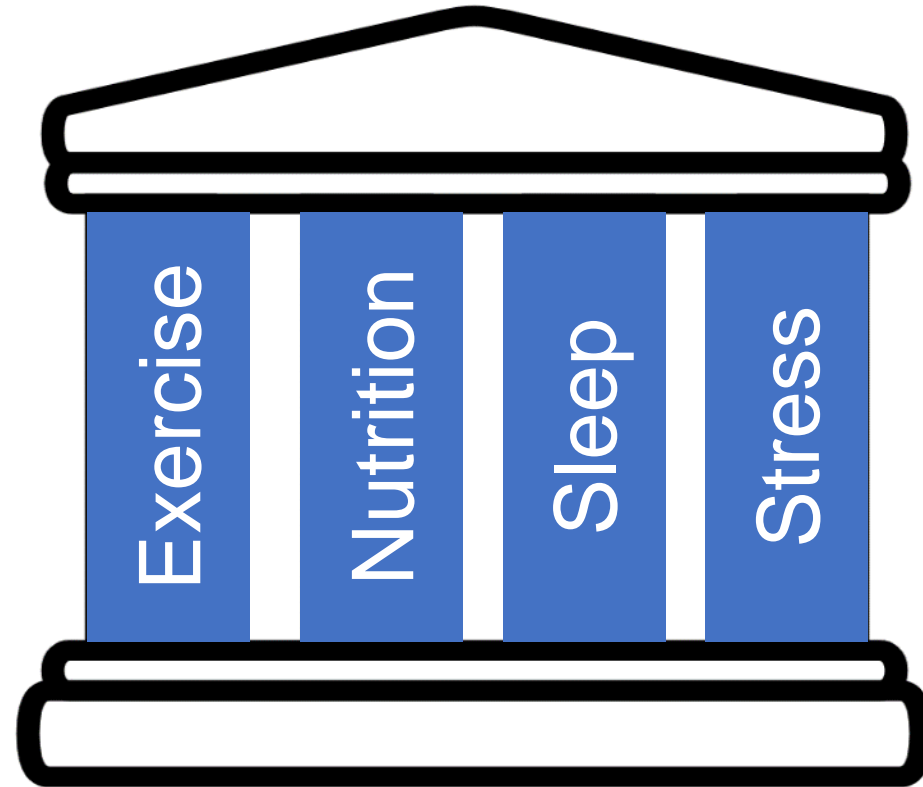
**Recommended in the clinical guidelines  
of leading cancer organizations**



# Optimizing Lifestyle Factors



**Lifestyle factors are foundational to long-term health and other cancer-related outcomes.**



Marinac et al. *JAMA Oncol*, 2016.  
Di Meglio A et al. *Curr Opin Oncol*, 2021.

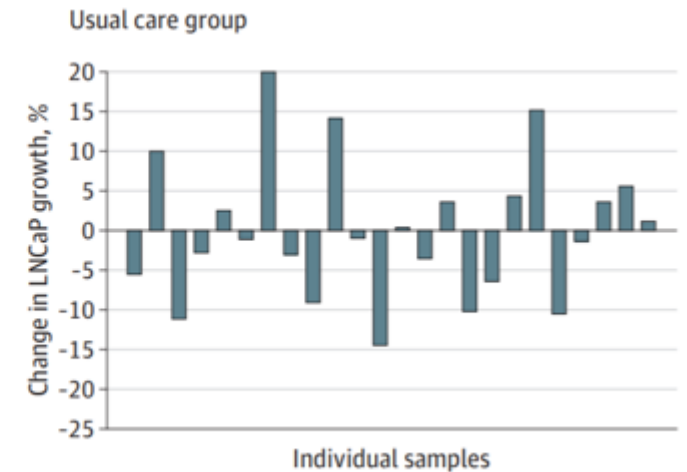
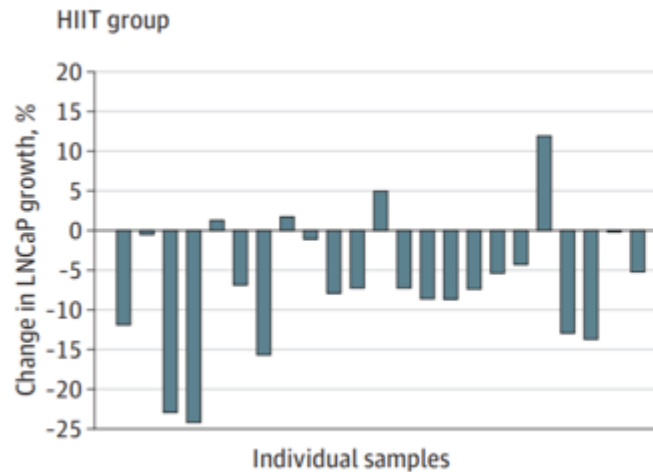
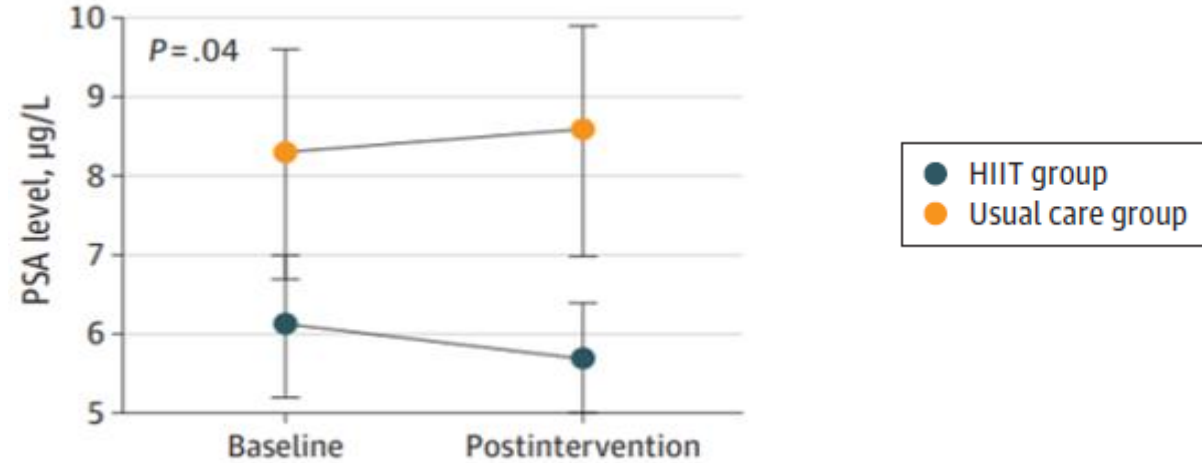
# Exercise may improve cardiorespiratory fitness and may slow the progression of prostate cancer for patients on active surveillance.



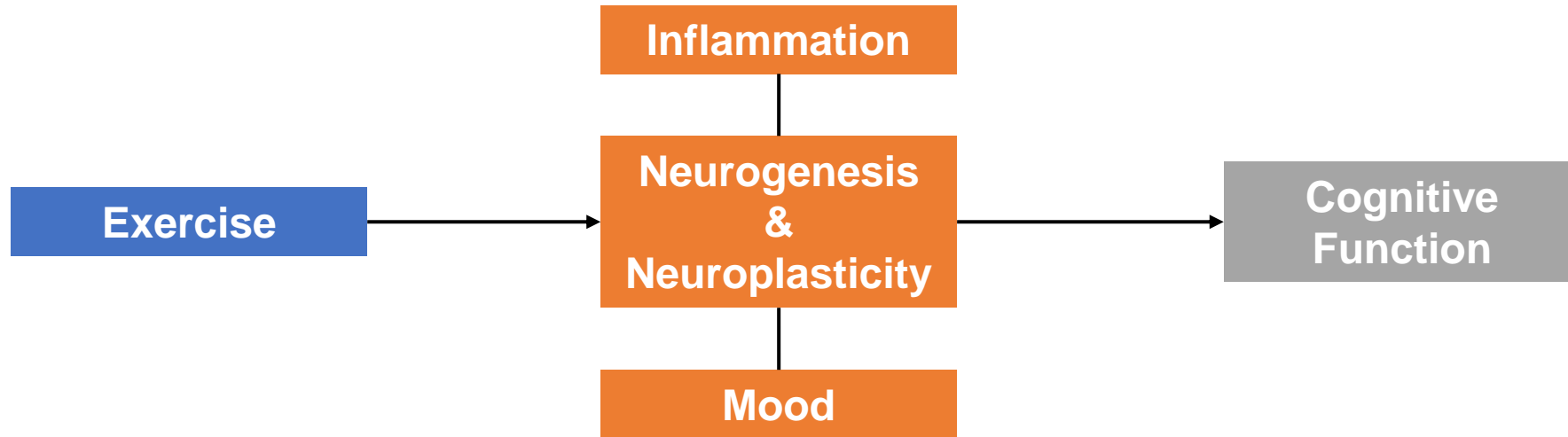
## Supervised aerobic treadmill sessions

85-95% of peak  $O_2$  consumption

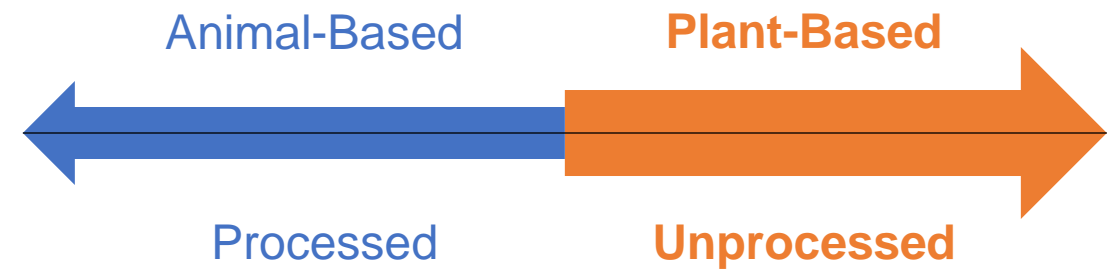
3 times a week for 12 weeks



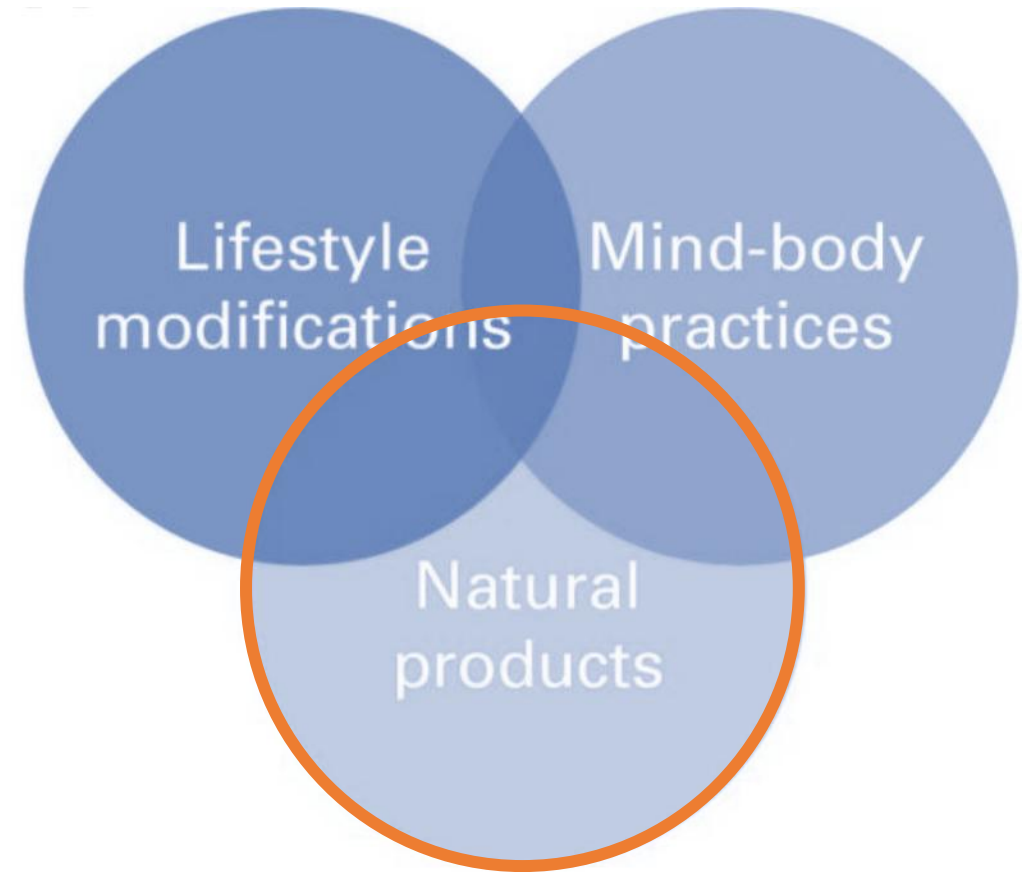
# Exercise is associated with improvements in cognitive function in people with cancer.



**A predominantly plant-based, whole-foods diet may be associated with lower risk of prostate cancer progression.**

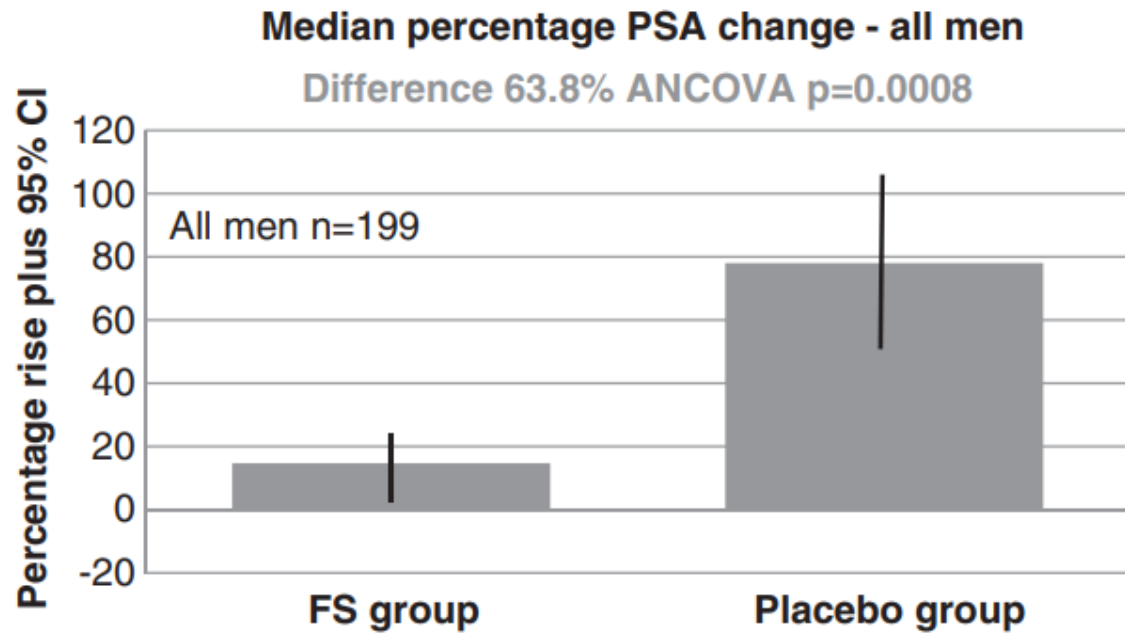


# Navigating Dietary Supplements





# Prostate cancer patients in the supplement group had smaller rise in PSA after 6 months, compared with those in a placebo group.



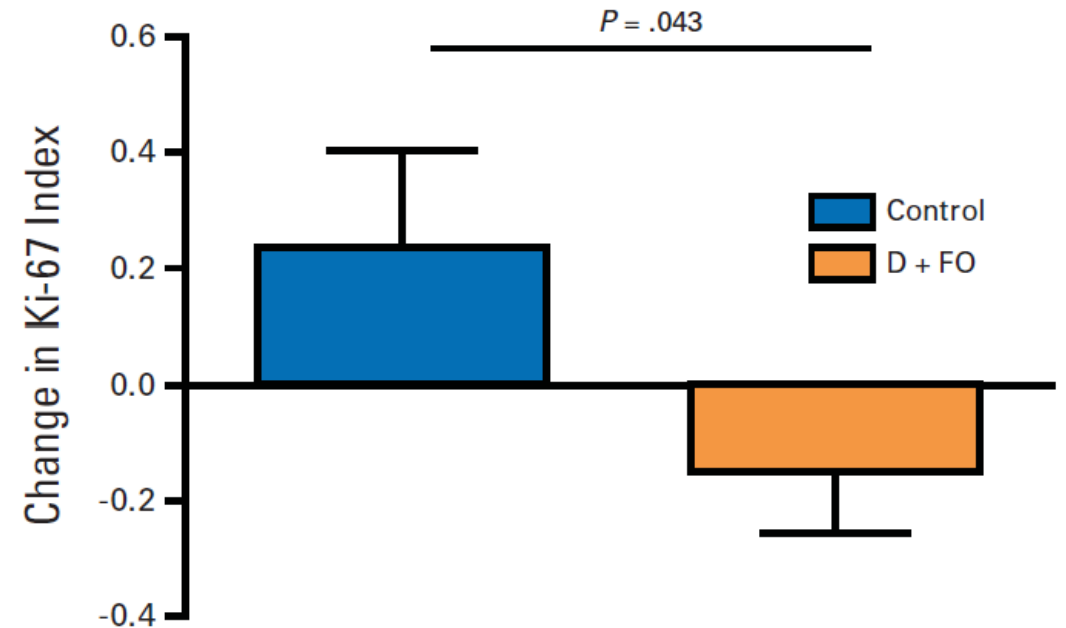
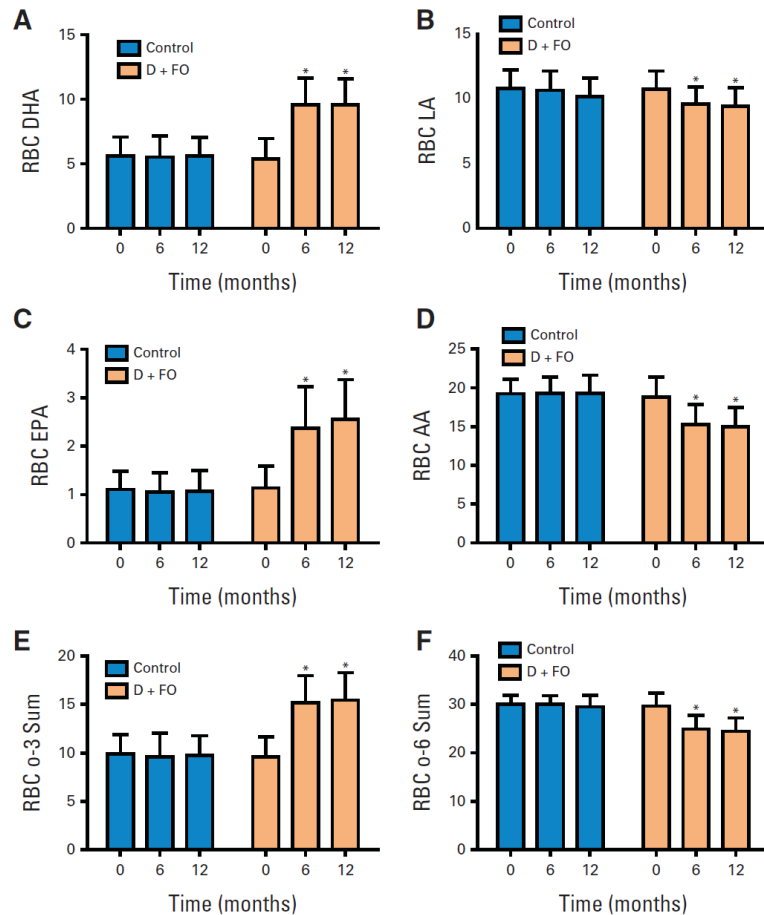
Key: FS = Food supplement, ANCOVA = Analysis of covariance,  
— = 95% confidence intervals

Figure 2. Median percentage rise in PSA between men taking the food supplement versus placebo.



Study participants were men with localized prostate cancer on active surveillance or men with rise in PSA after initial treatments.

# A high omega-3, low omega-6 diet with fish oil supplementation resulted in a reduction in biomarkers of prostate cancer progression.



# Most dietary supplements are not regulated and do not undergo rigorous quality assurance testing.

Original Investigation | Public Health

August 10, 2022

## Analysis of Select Dietary Supplement Products Marketed to Support or Boost the Immune System

Cindy Crawford, BA<sup>1,2</sup>; Bharathi Avula, PhD<sup>3</sup>; Andrea T. Lindsey, MS<sup>1,2</sup>; Abraham Walter, MS<sup>1,2</sup>; Kumar Katragunta, PhD<sup>3</sup>; Ikhlas A. Khan, PhD<sup>3</sup>; Patricia A. Deuster, PhD, MPH<sup>1</sup>

30 dietary supplements purchased from Amazon.com

57% had inaccurate labels

43% had ingredients on labels that were not detected by tests

30% had substances detected that were not listed on the labels

Use supplements verified by third-party labs!



# Here are some key considerations regarding OTC supplements.

Supplement Facts		
Serving Size 4 Capsules Servings Per Container 30		
	Amount Per Serving	%DV
Calories	10	
Total Carbohydrate	1 g	< 1%*
Protein	1 g	
Vitamin A (as Beta-Carotene)	1500 mcg RAE	167%
Vitamin C (as Ascorbic Acid and from Camu-Camu Fruit)	60 mg	67%
Vitamin D (D3 as Cholecalciferol)	62.5 mcg	313%
Vitamin E (as d-alpha Tocopherol)	3.5 mg	23%
Biotin	3000 mcg	10000%
Iodine (from Organic Kelp)	225 mcg	150%
Zinc (as Zinc Amino Acid Chelate)	25 mg	227%
Selenium (as Selenium Amino Acid Chelate)	200 mcg	364%
<b>Synergen Complex® (Patented)</b>	<b>1.72 g</b>	†
Saw Palmetto Extract (Fruit) (45% Fatty Acids), Hydrolyzed Marine Collagen, Sensoril® Ashwagandha Extract (Root and Leaf), BCM-95® Bio-Curcumin® Turmeric Extract (Rhizome) (86% Curcuminoids), Palm Extract (Fruit) (15% Tocotrienol), Hyaluronic Acid		

High-dose IV vitamin C + docetaxel did not improve outcomes in metastatic castration-resistant prostate cancer, compared with docetaxel alone.

Excessive biotin supplementation may interfere with PSA testing and other common laboratory tests.

Dosing matters!

Many herbs interact with common medications.

Paller et al. *Cancer Res Commun*, 2024.  
Mrosewski et al. *Clin Lab*, 2019.  
Cheema et al. *J Intern Med*, 2001.

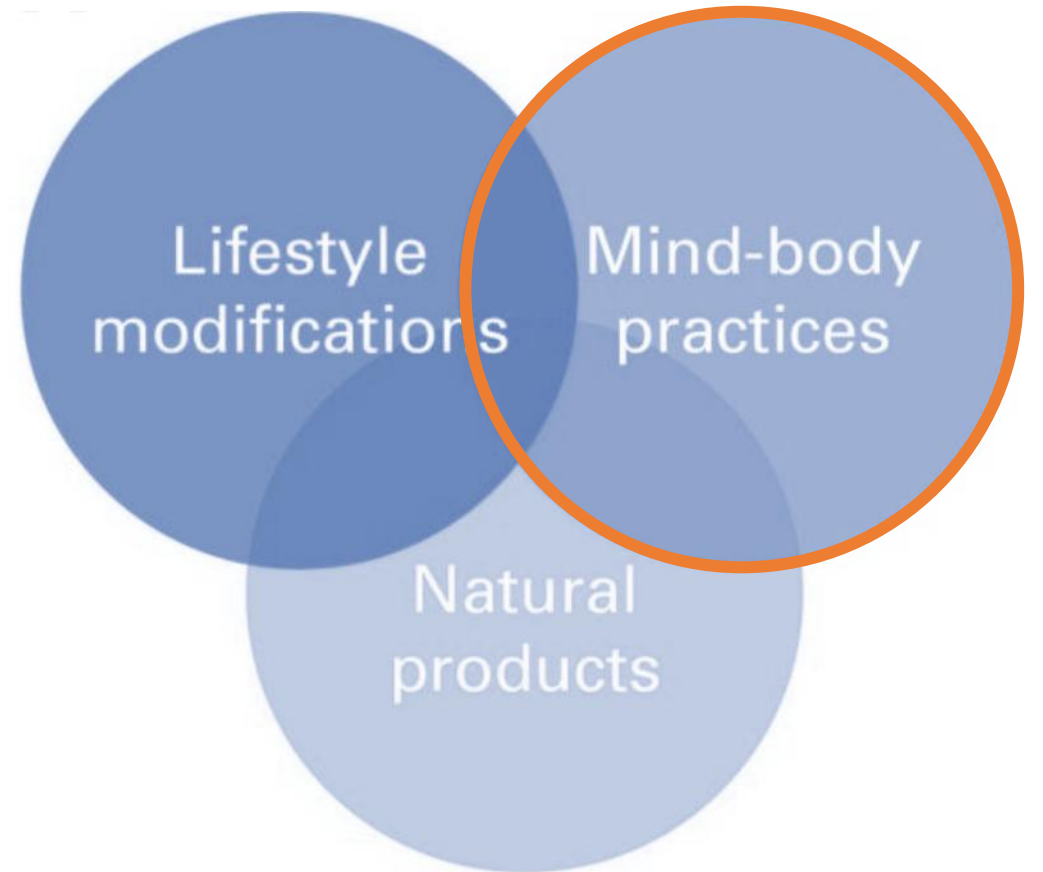
# Refer to reliable sources of information on dietary supplements.

The screenshot shows the Memorial Sloan Kettering Cancer Center website's 'Search About Herbs' page. The page features a search bar with the text 'Enter a search term.' and a 'Search' button. Below the search bar is a 'Browse by name:' section with a row of buttons for each letter of the alphabet from # to Z. The page is divided into two columns: 'Letter: C, Total: 35 Herbs' and 'Letter: M, Total: 18 Herbs'. Each column lists herbs with their names, images, and details on 'Purported Uses', 'Mechanism of Action', and 'Potential Interactions'. For example, under 'Letter: C', it lists Capsaicin, Carnitine, and Cascara. Under 'Letter: M', it lists Milk Thistle, Mistletoe (European), and Moringa oleifera.

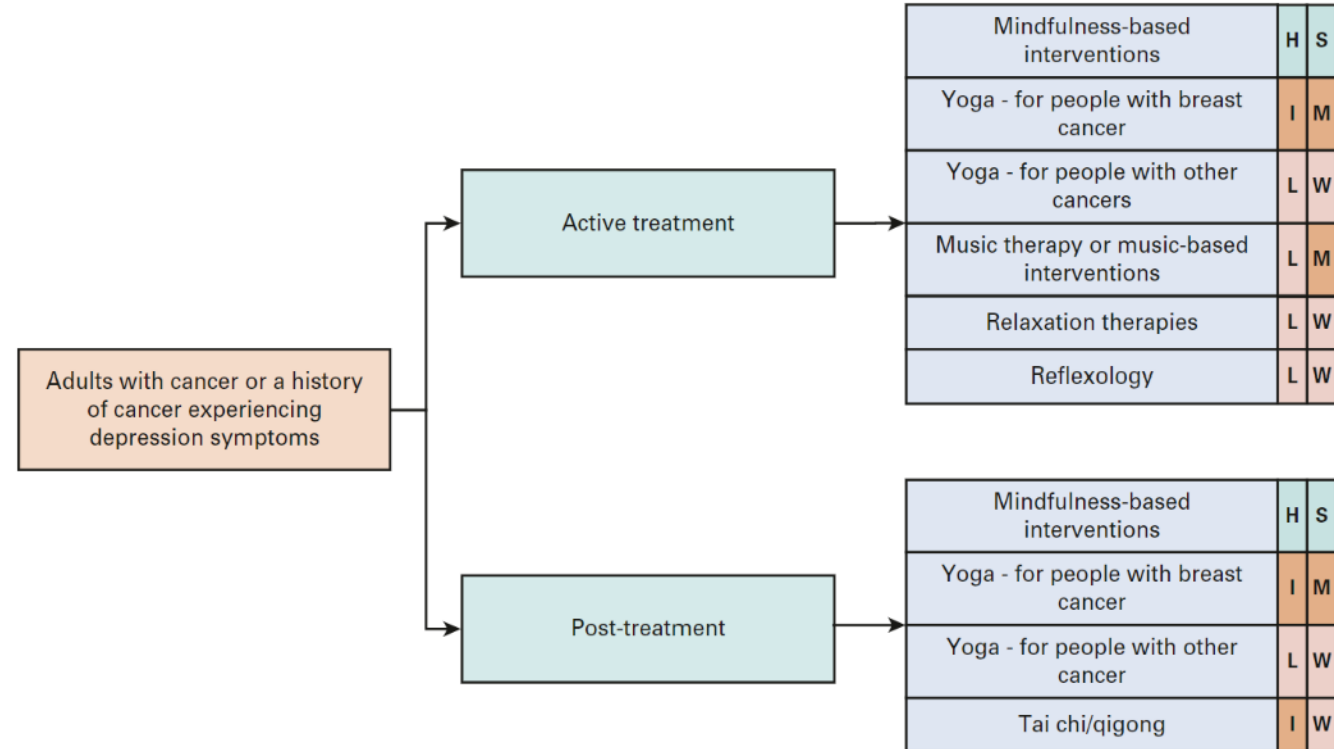
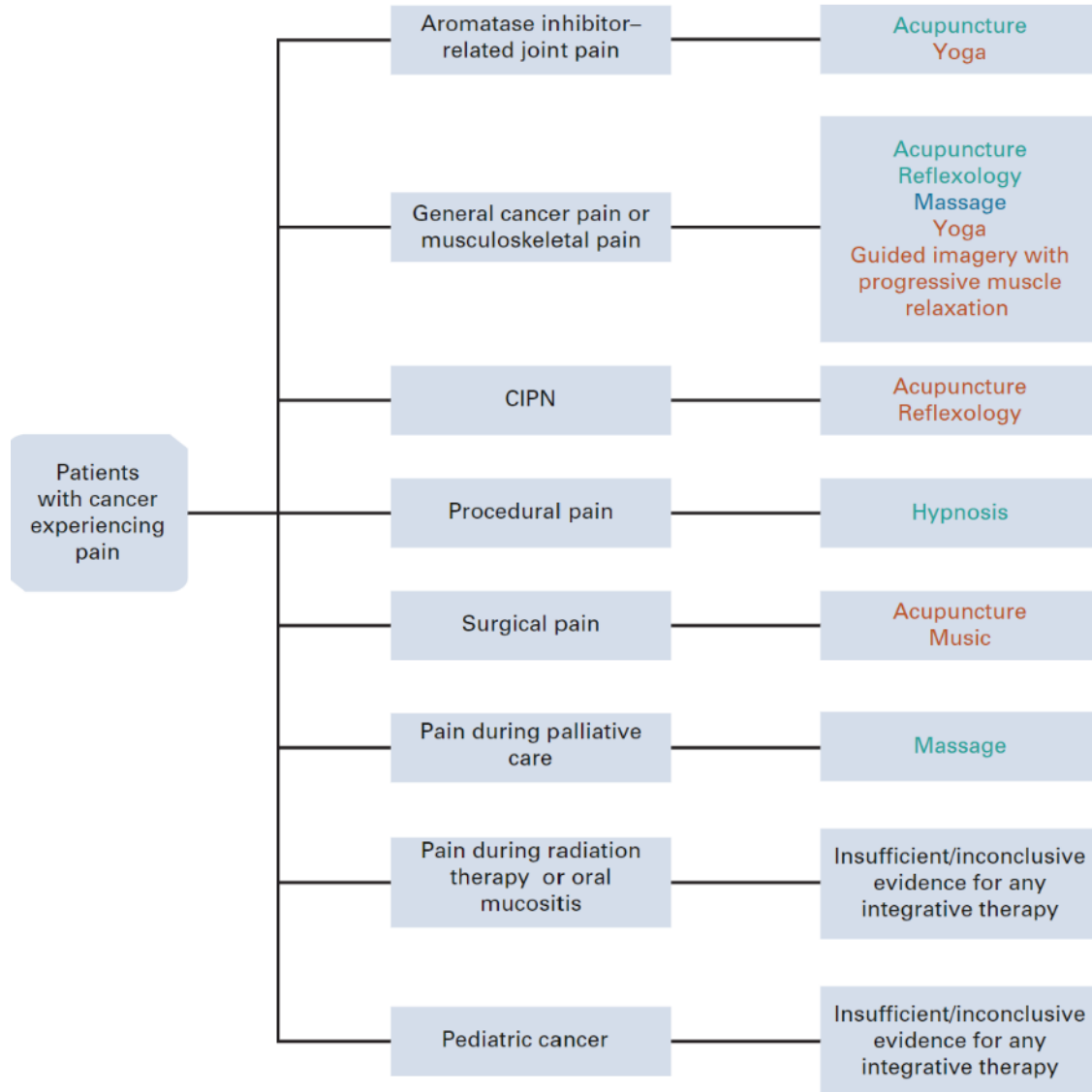


The screenshot shows the ConsumerLab.com website's navigation bar and search area. The navigation bar includes the ConsumerLab.com logo (with a '22 YEARS' anniversary badge), and links for 'Product Reviews', 'Health Conditions', 'Brands', 'Warnings', 'Answers', and 'News'. Below the navigation bar is a search bar with a magnifying glass icon, the text 'Search', and a blue 'SEARCH' button.

# Exploring Mind-Body Practices



# Many mind-body therapies are recommended by the American Society of Clinical Oncology (ASCO) for symptom management.



Mao et al. *J Clin Oncol*, 2022.  
Carlson et al. *J Clin Oncol*, 2023.

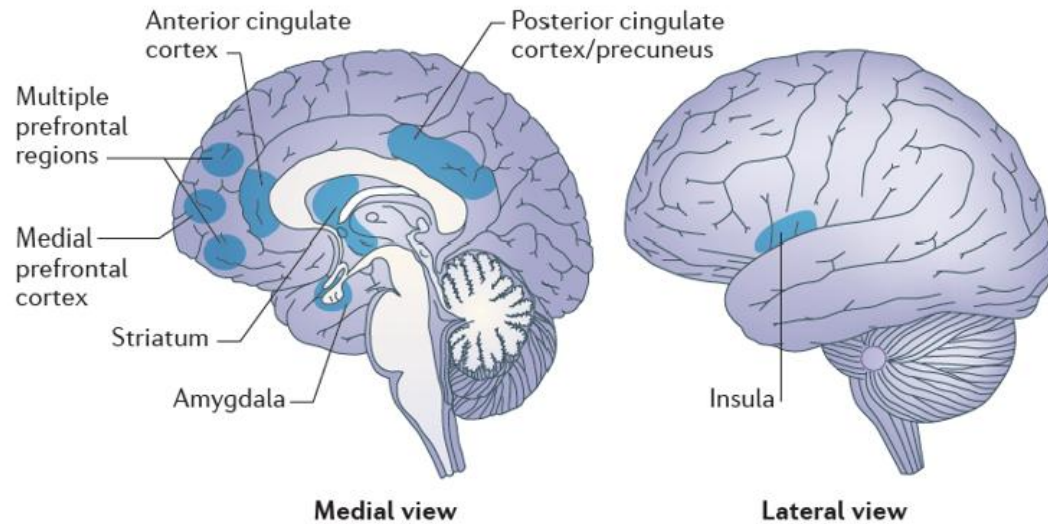


# Many mind-body therapies are recommended by the American Society of Clinical Oncology (ASCO) for symptom management.

Population	Symptom setting	Intervention	Evidence Quality	Strength of Rec.
Survivors of adult cancer, defined as starting from the time of diagnosis to any time thereafter, with cancer-related fatigue	During active treatment <sup>a</sup>	Exercise (aerobic, resistance, or a combination)	M	S
		Cognitive behavioral therapy with or without hypnosis	M	S
		Mindfulness-based programs (MBSR)	M	S
		Tai chi or qigong	M	S
		Psychoeducation	M	C
		American ginseng ( <i>Panax quinquefolius</i> )	L	C
	After active treatment <sup>b</sup>	Exercise (aerobic, resistance, or a combination)	M	S
		Cognitive behavioral therapy	M	S
		Mindfulness-based programs (MBSR, MBCT, MAPs)	M	S
		Yoga	L	C
		Acupressure	L	C
		Moxibustion	L	C
	End-of-Life <sup>c</sup>	Cognitive behavioral therapy	L	C
		Corticosteroids	L	C



# Mindfulness-based interventions demonstrate effects on brain regions involved in mood regulation, pain processing, and stress.



Received: 25 February 2021 | Revised: 29 April 2021 | Accepted: 7 June 2021

DOI: 10.1002/pon.5749

WILEY

## REVIEW

### Mindfulness-based interventions for psychological wellbeing and quality of life in men with prostate cancer: A systematic review and meta-analysis

Daniel A. Nnate<sup>1</sup> | Canice C. Anyachukwu<sup>2</sup> | Sylvester E. Igwe<sup>2</sup> | Ukachukwu O. Abaraogu<sup>2,3</sup>

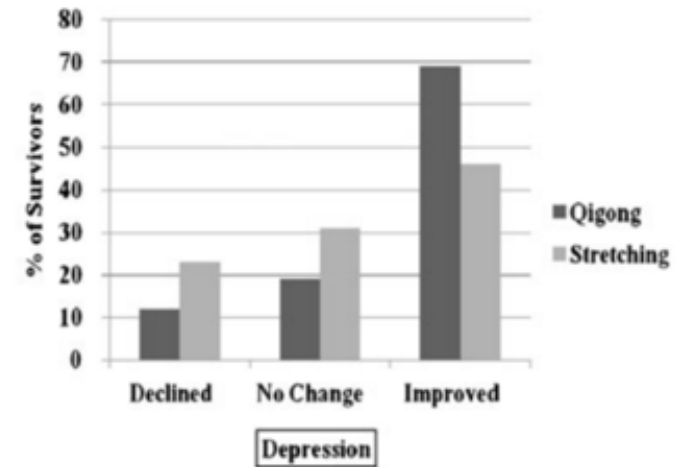
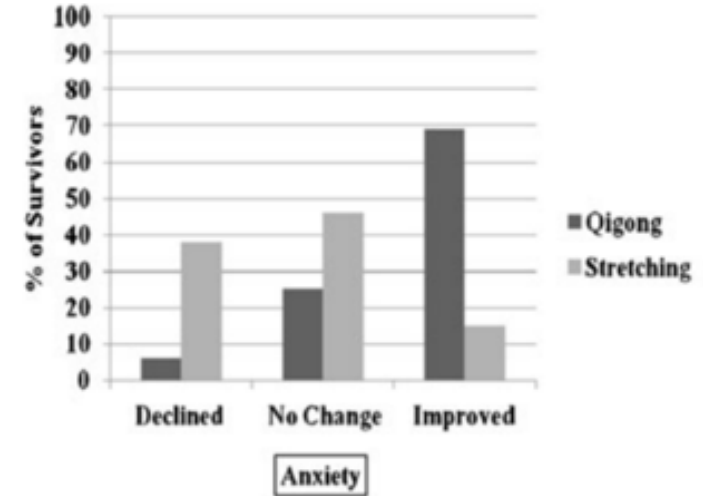
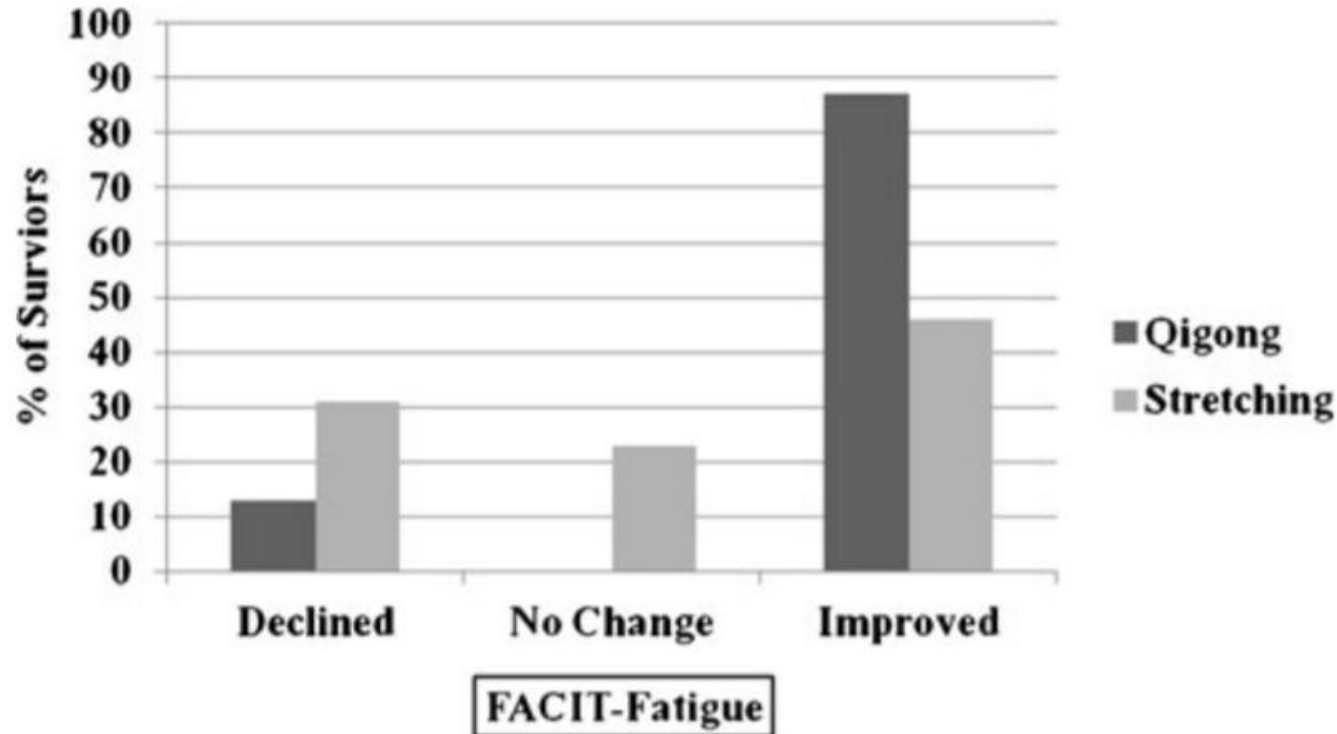
#### 4 Clinical Trials in Prostate Cancer

Mindfulness interventions demonstrated effects on:

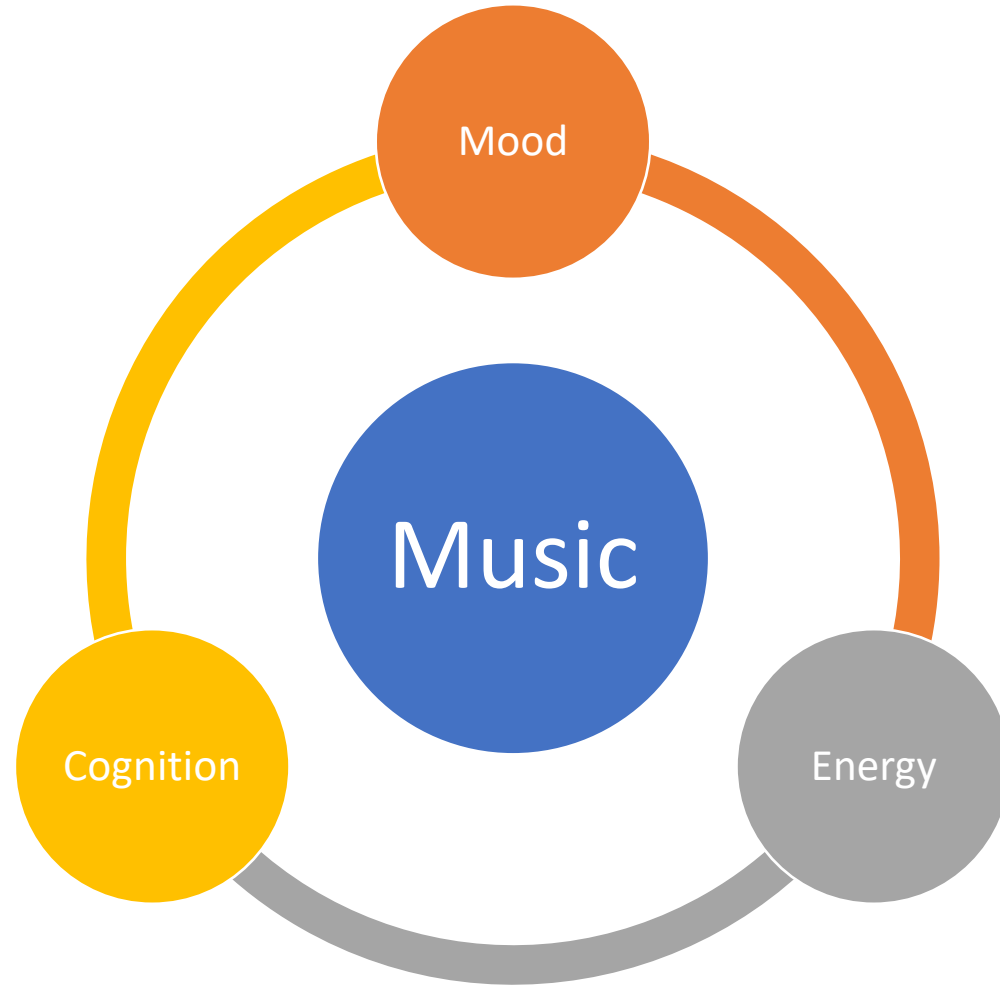
Psychological Distress and Quality of Life

Fox KC et al. *Neurosci Biobehav Rev.* 2014.  
Tang YY et al. *Nat Rev Neurosci.* 2015.  
Nnate et al. *Psychooncology*, 2021.

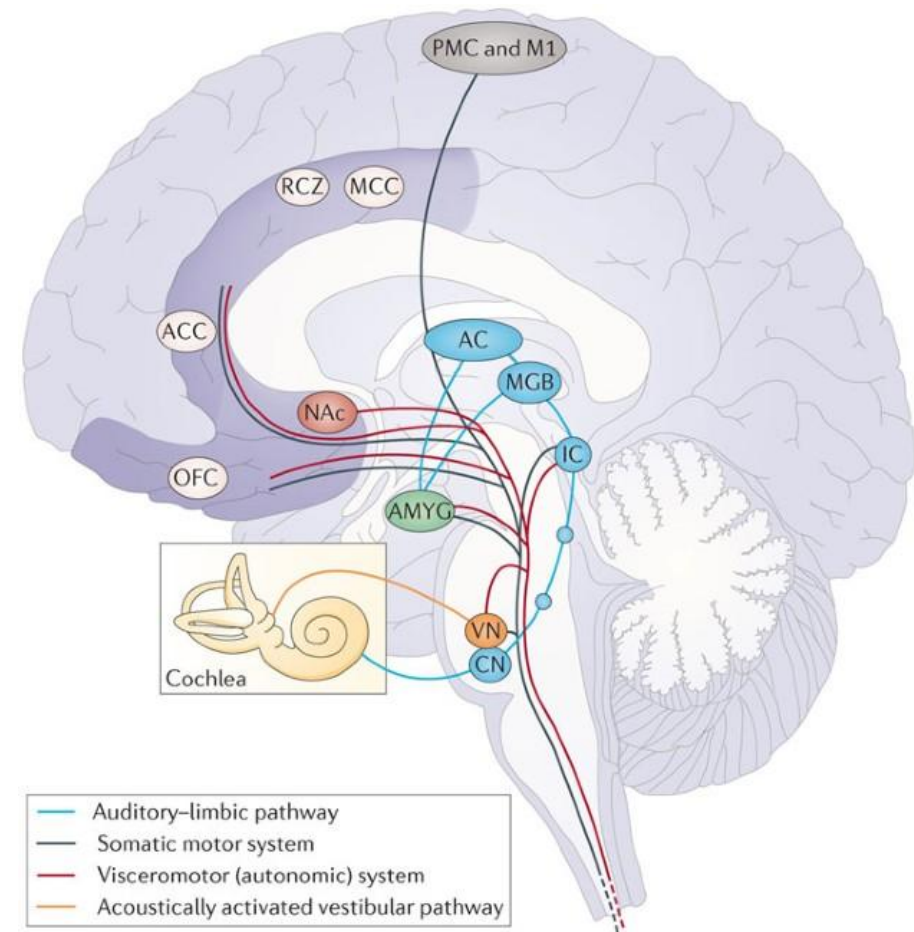
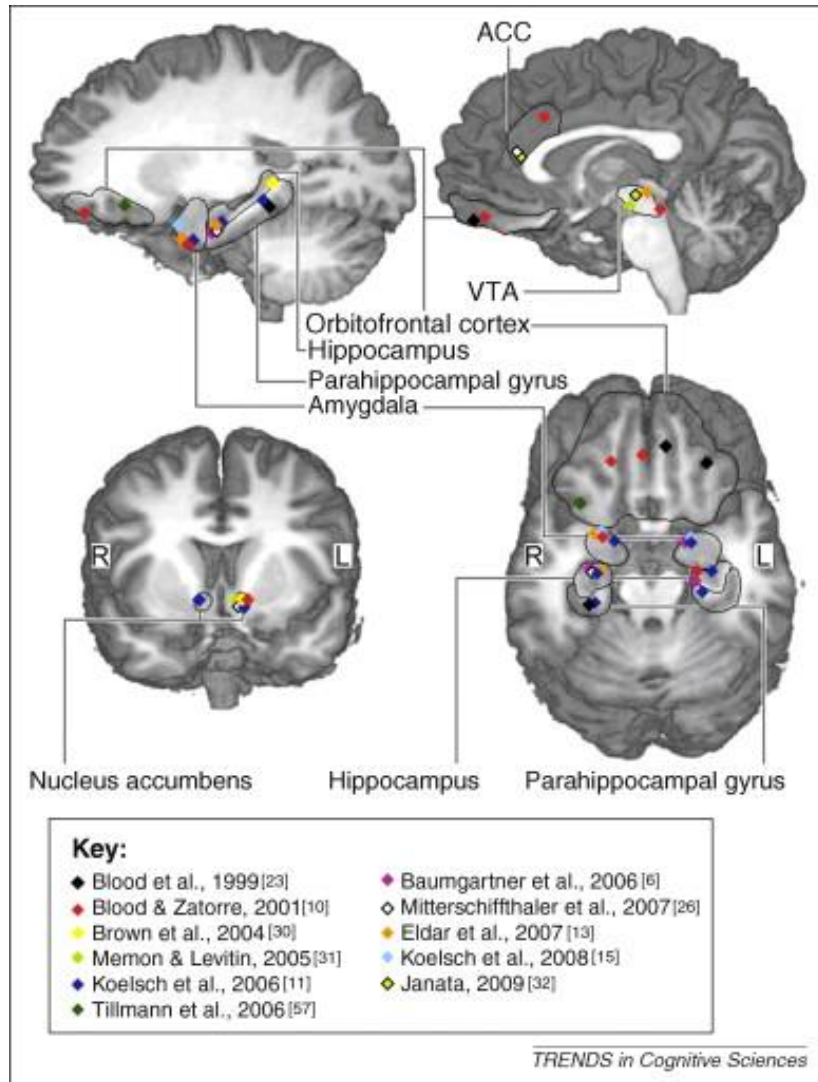
# Qi gong and tai chi may improve fatigue, psychological distress, and sleep in men with prostate cancer.



**Music is a practical and accessible tool for regulating mood, energy, and cognition.**



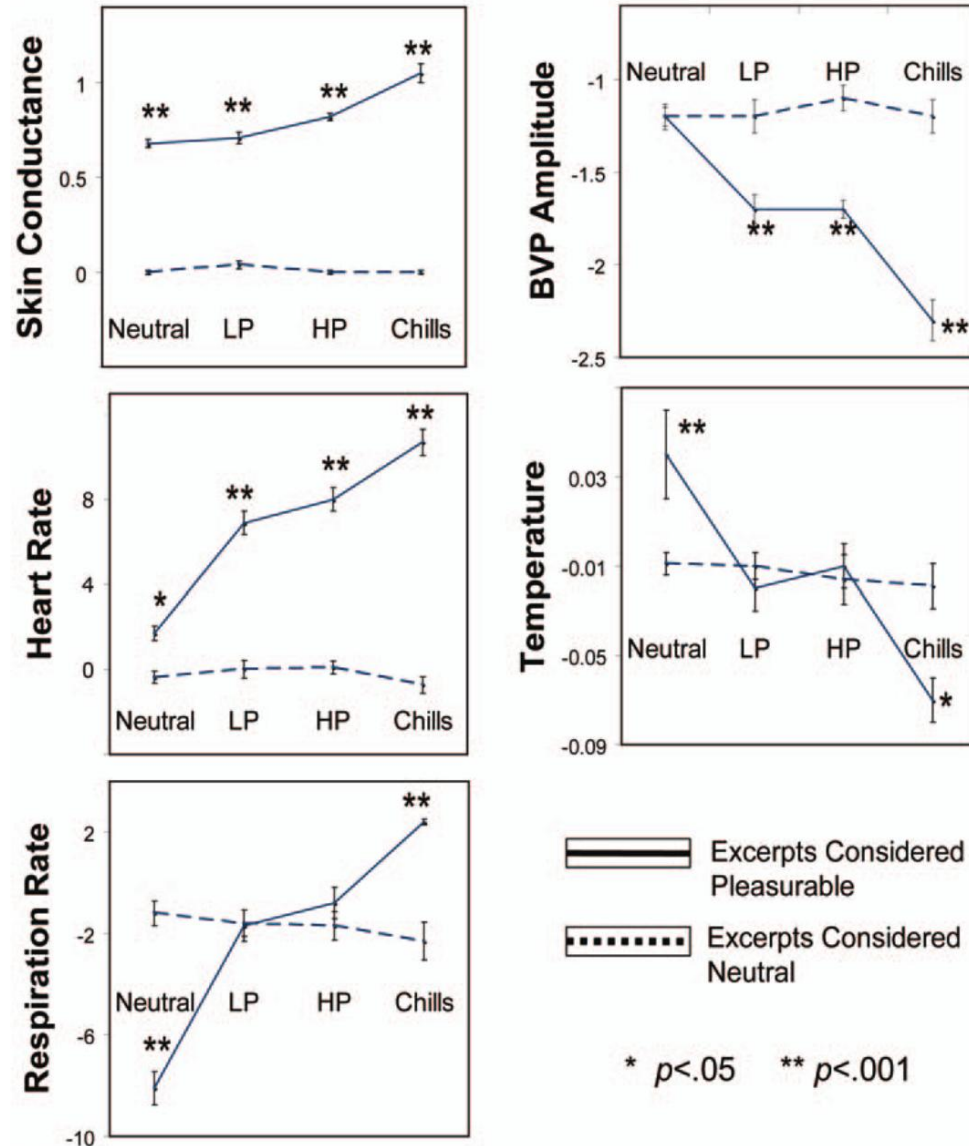
# Music induces changes in activity of the brain structures underlying emotion and mood regulation.



Nature Reviews | Neuroscience

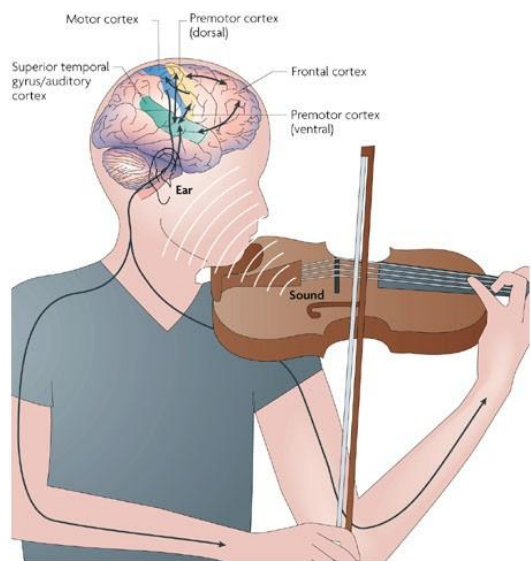
Koelsch S. *Trends Cogn Sci*, 2010.  
Koelsch S. *Nat Rev Neurosci*, 2014.

# Music-induced pleasure is associated with activation of the sympathetic branch of the nervous system responsible for arousal and motivation.





# Musical engagement has been associated with changes in brain regions underlying cognitive functions.



Nature Reviews | Neuroscience

*Musical training is cognitively demanding and requires integrating various inputs and tasks*

## FRONTAL LOBE

**INCREASED GREY MATTER VOLUME**  
superior, medial, inferior frontal gyrus – executive functions

**INCREASED fMRI ACTIVATION**  
primary & supplementary motor areas – motor preparation and execution  
Broca's area – speech production

## TEMPORAL LOBE

**INCREASED GREY MATTER VOLUME & INCREASED fMRI ACTIVATION**  
Heschl's gyrus – primary auditory cortex, pitch perception  
superior temporal gyrus – auditory processing

**INCREASED MISMATCH NEGATIVITY (EEG)**

## BASAL GANGLIA & LIMBIC SYSTEM

**INCREASED GREY MATTER VOLUME**  
hippocampus – memory formation & retrieval

**INCREASED EEG RESPONSE**  
temporal-limbic areas – emotions and memory

## PARIETAL LOBE

**INCREASED GREY MATTER VOLUME**  
primary somatosensory cortex – touch perception

**INCREASED fMRI ACTIVATION**  
supramarginal gyrus – syntax processing and attention

## WHITE MATTER TRACTS

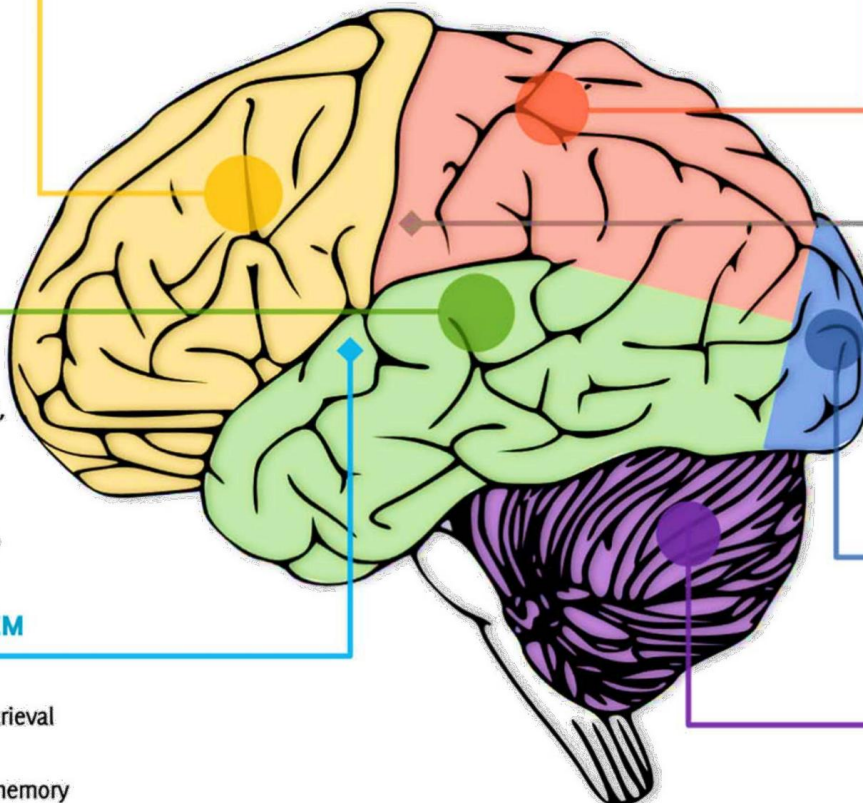
**INCREASED WHITE-MATTER INTEGRITY**  
corpus callosum – connects brain hemispheres  
corticospinal tracts – connect motor areas with spinal cord  
short fibres – connect sensory and motor areas  
striatum – motor planning and reward perception

## OCCIPITAL LOBE

**INCREASED GREY MATTER VOLUME**  
lingual gyrus - score reading

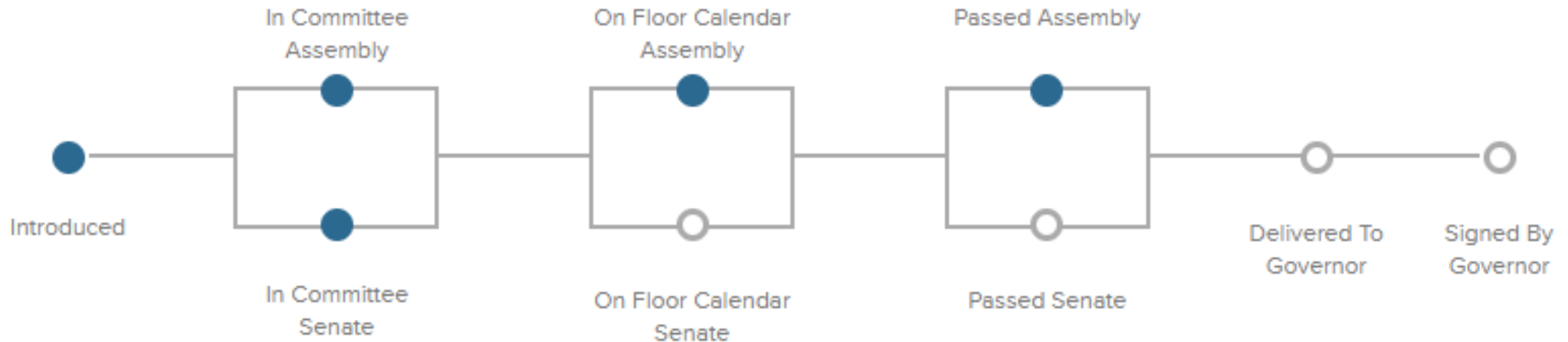
## CEREBELLUM

**INCREASED GREY & WHITE MATTER VOLUME**  
movement coordination and motor learning



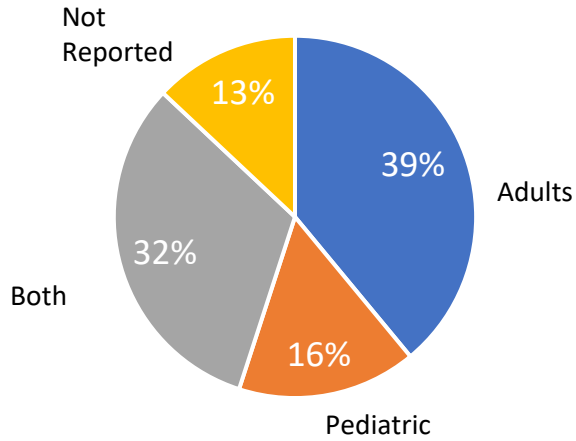
# NY Assembly Bill A6173 seeks to include outpatient care provided by creative arts therapists in certain insurance policies covering care for other mental health services.

## CURRENT BILL STATUS - In Senate Committee Insurance Committee

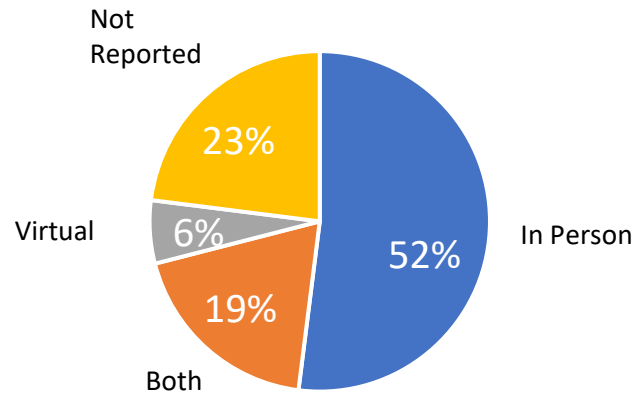


# Around half of NCI-designated cancer centers offer music-based interventions.

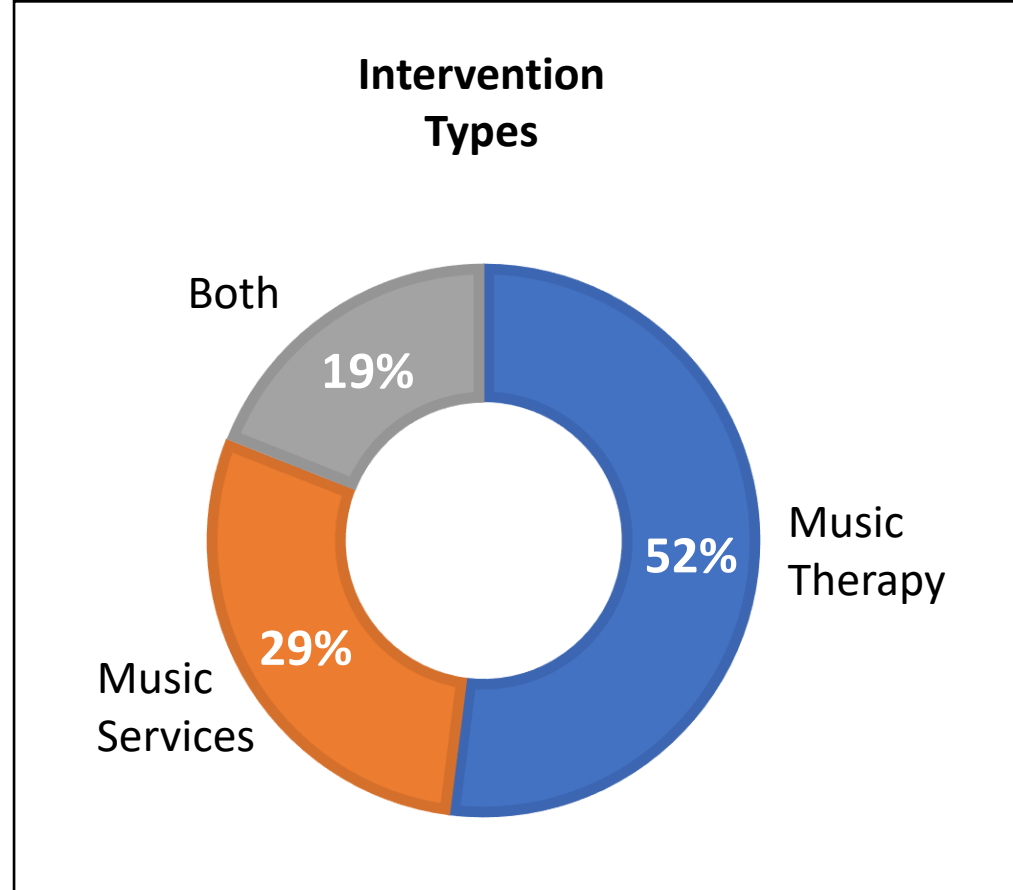
## Population



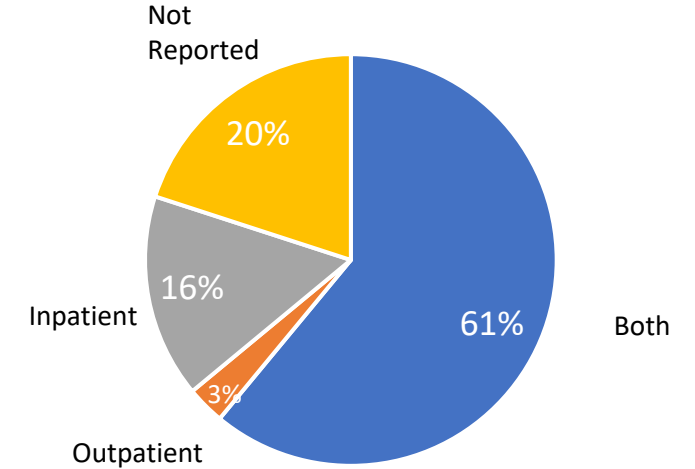
## Delivery Format



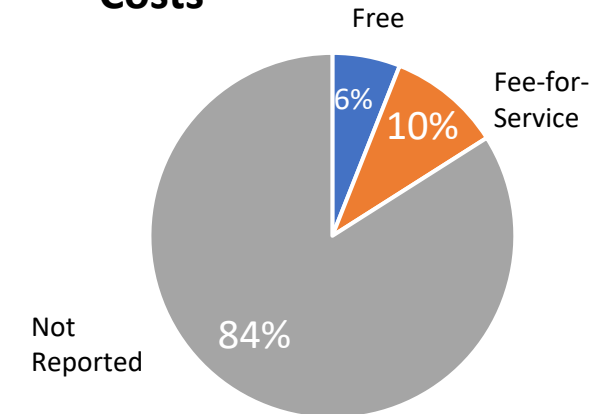
## Intervention Types



## Setting

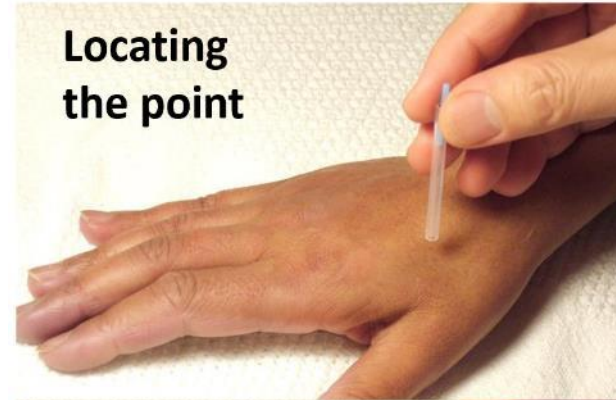


## Costs





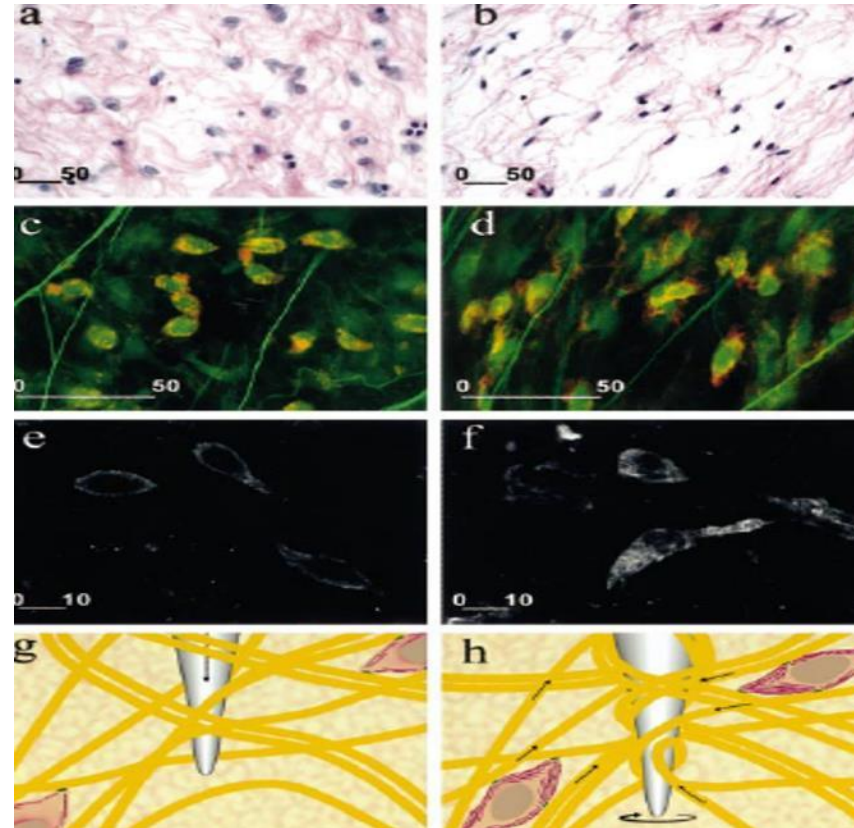
**Acupuncture is administered with sterile, single-use, disposable hair-thin needles.**



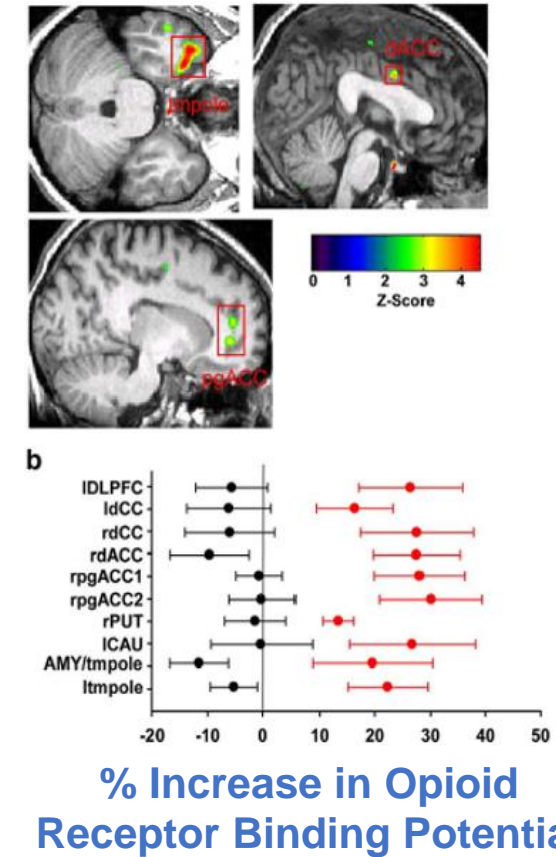
# Acupuncture produces a local stretching of tissue, which is translated by unique cells into systemic effects.



**Local Stretch**



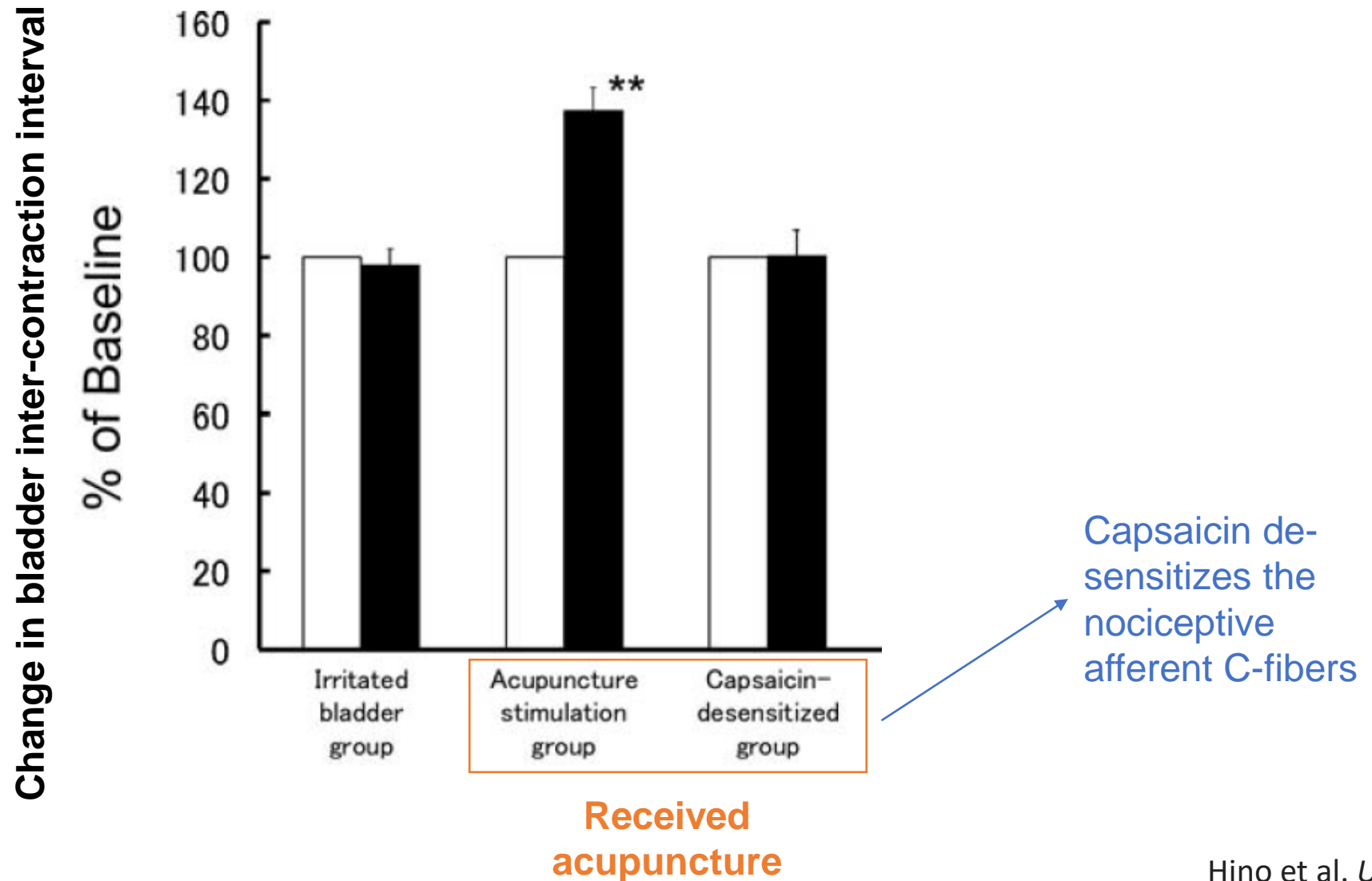
**Changes in Cell Signaling**



**Systemic Effects**

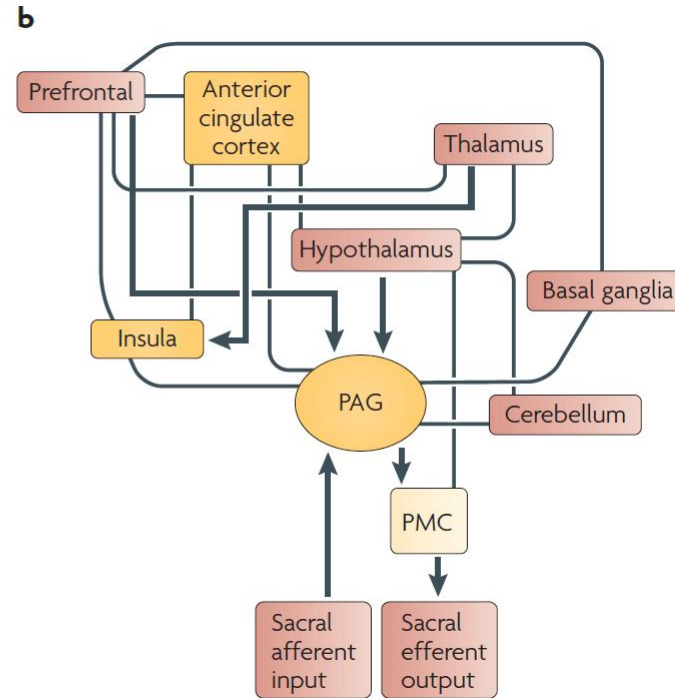
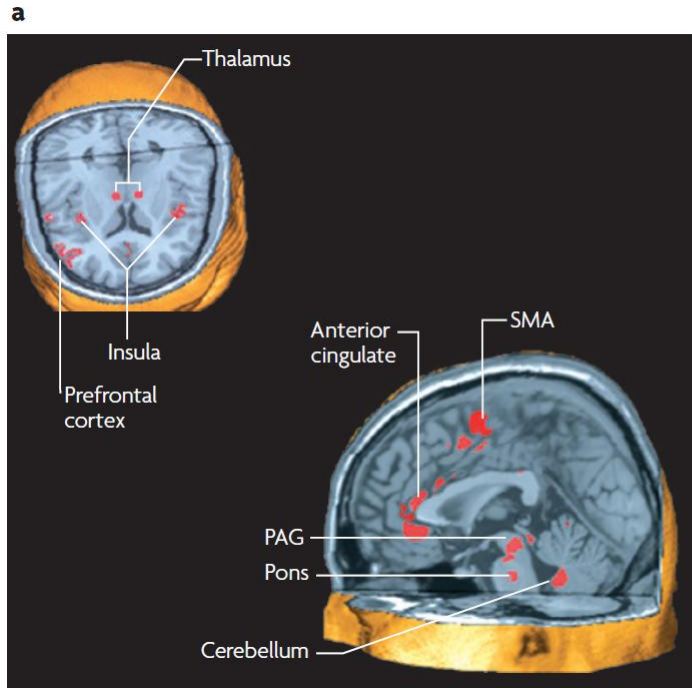
Langevin et al. *FASEB*, 2001.  
 Langevin et al. *New Anat*, 2002.  
 Harris et al. *Neuroimage*, 2009.

# Acupuncture affects the nerves innervating the bladder and urinary tract.

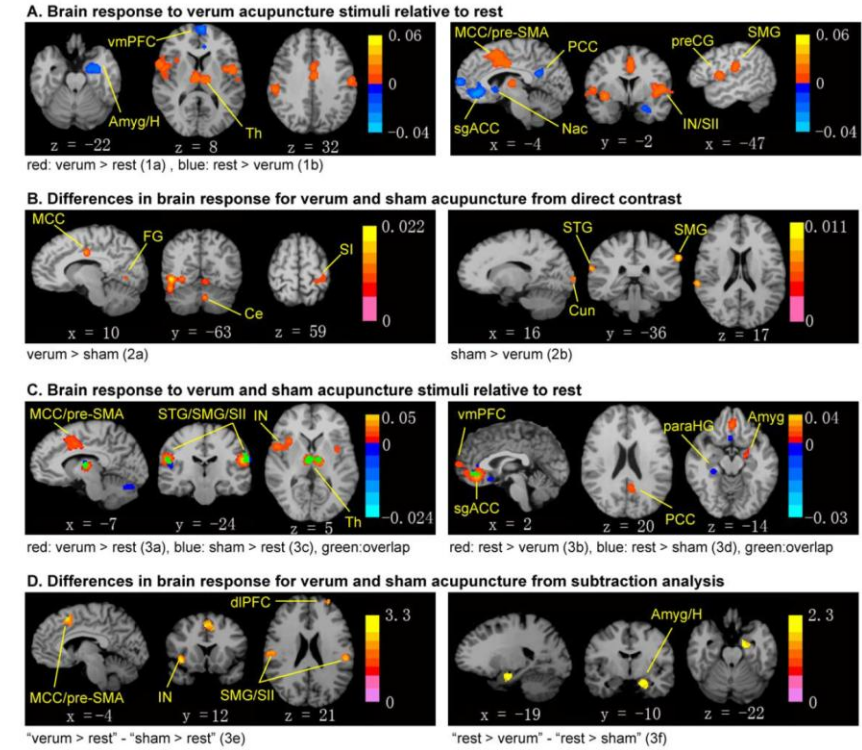




# Acupuncture affects brain regions responsible for urination.



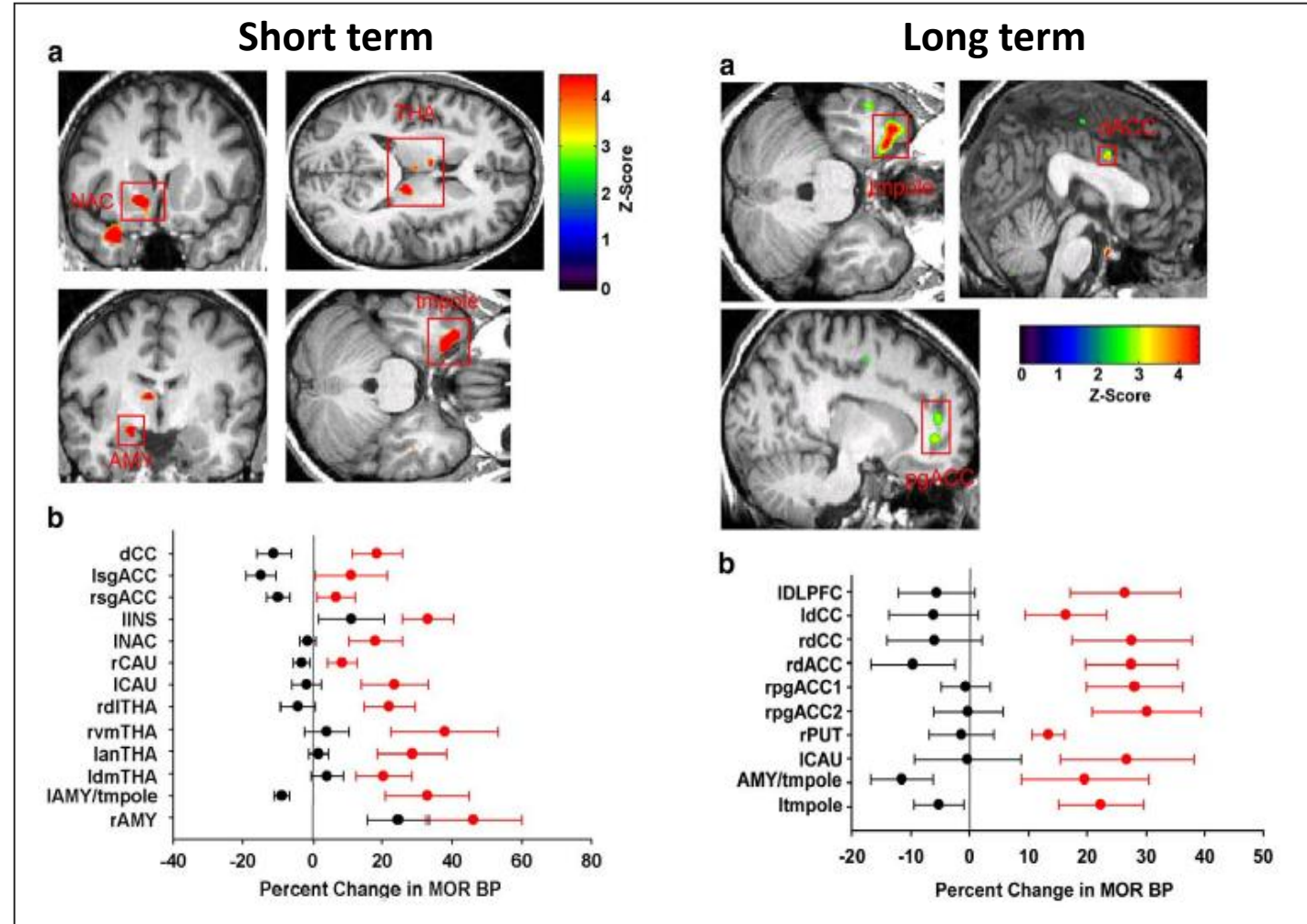
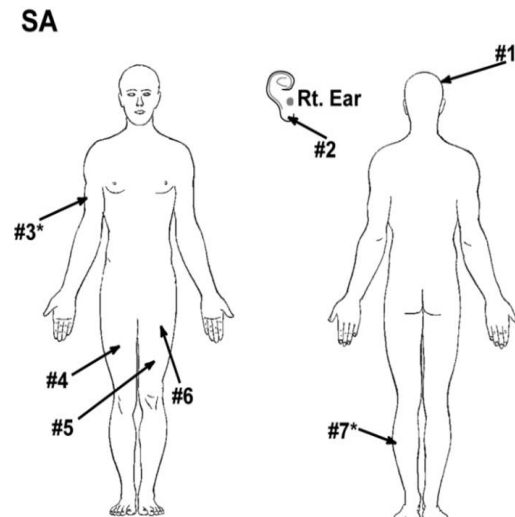
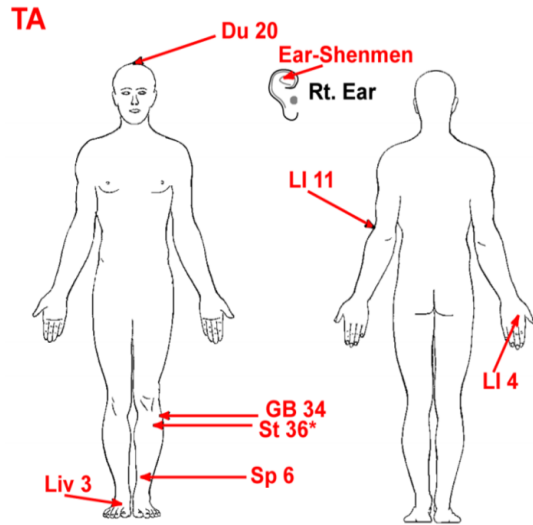
**Brain regions controlling micturition**



**Brain response to acupuncture**

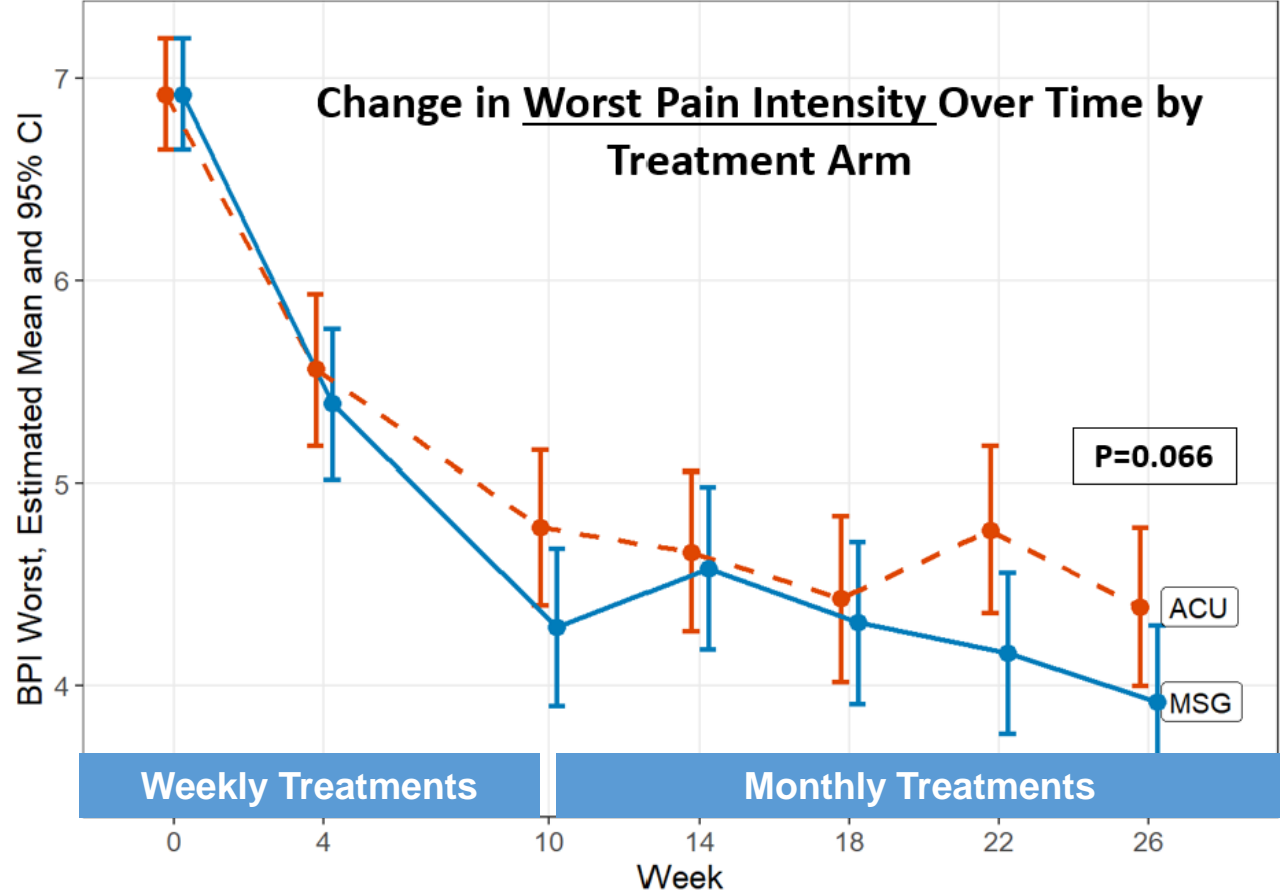
Huang et al. *PLoS One*, 2012.  
 Fowler et al. *Nat Rev Neurosci*, 2008.  
 Griffiths D. *Nat Rev Urol*, 2015.

# Acupuncture increases opioid receptor binding potential in brain regions involved in pain processing.



Acupuncture, red circles; Sham, black circles.

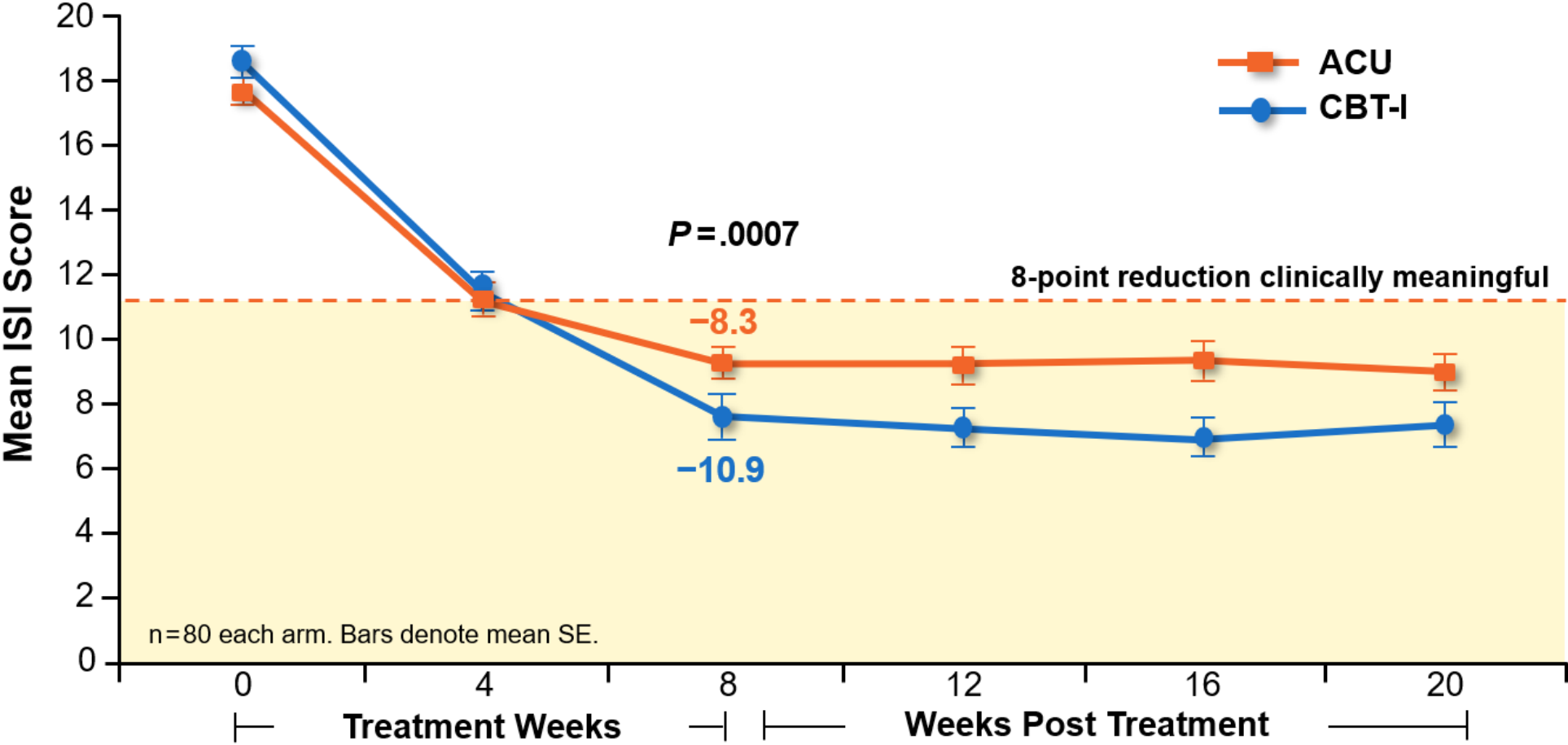
# Both acupuncture and massage produced clinically meaningful and durable pain reduction among people living with advanced cancer.



BPI = Brief Pain Inventory, ACU = Acupuncture, MSG = Massage



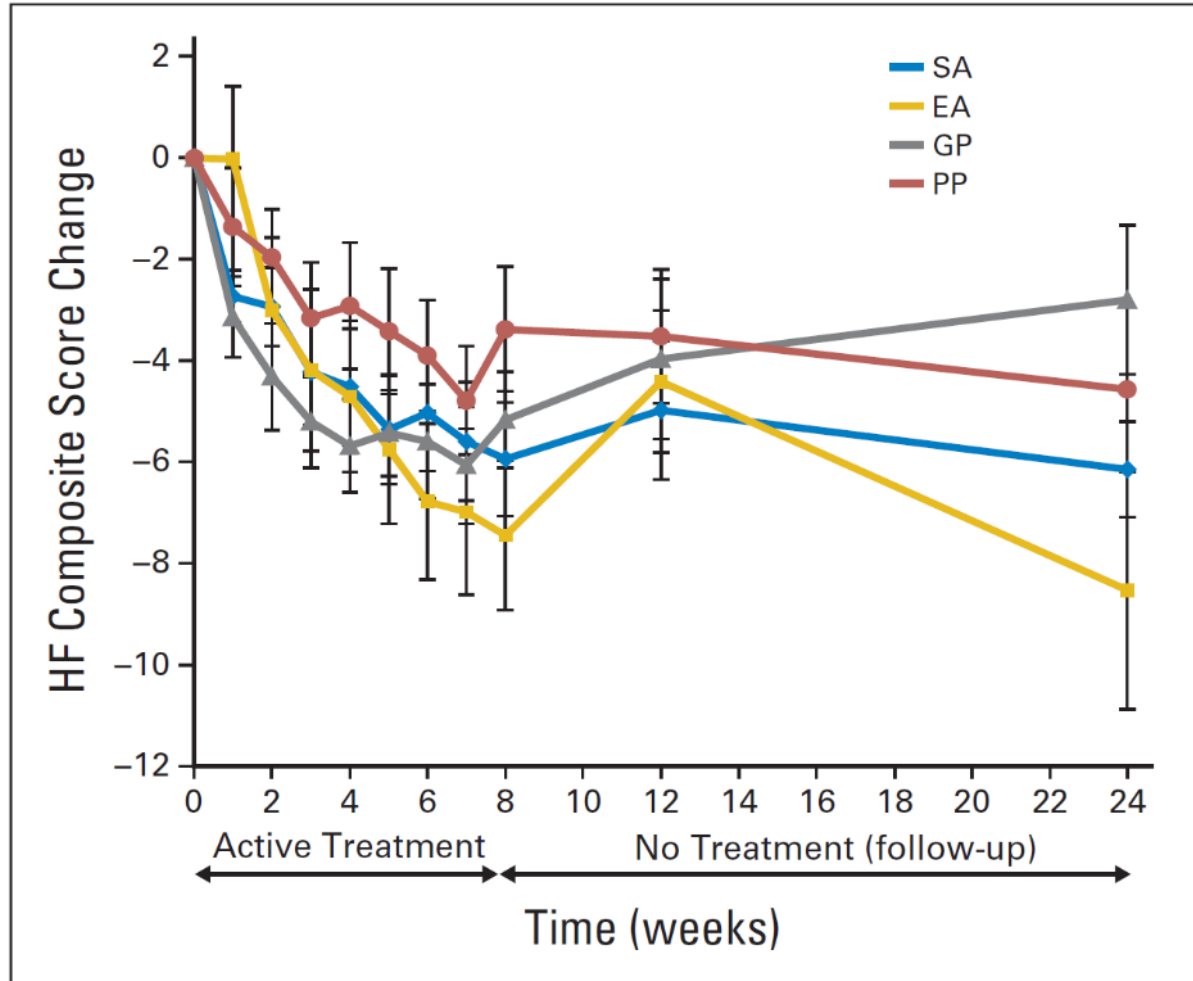
# Both acupuncture and cognitive-behavioral therapy produced clinically meaningful and long-term improvements in insomnia.



ISI = Insomnia Severity Index

Garland et al. *J Natl Cancer Inst*, 2019.

# Acupuncture produced greater reduction in hot flash symptoms with fewer side effects, compared to gabapentin.



**Table 3.** Specific Adverse Effects by Treatment Groups

Adverse Effects*	Electroacupuncture		Gabapentin	
	Real (n = 30)	Sham (n = 32)	Placebo (n = 30)	Real (n = 28)
Bruising	4 (13)	0 (0)	0 (0)	0 (0)
Constipation	0 (0)	0 (0)	1 (3)	0 (0)
Dizziness	0 (0)	0 (0)	4 (13)	5 (18)
Dry mouth	0 (0)	0 (0)	0 (0)	1 (3)
Fatigue	0 (0)	0 (0)	1 (3)	4 (14)
Headache	0 (0)	0 (0)	1 (3)	0 (0)
Increased pain	1 (3)	0 (0)	0 (0)	0 (0)
Drowsiness	0 (0)	1 (3)	1 (3)	3 (11)

NOTE. Data are given as No. (%) of subjects who experienced adverse effects in each treatment group.  
 \*All adverse effects were graded as mild.

SA = sham acupuncture  
 EA = electro-acupuncture  
 GP = gabapentin pill  
 PP = placebo pill



# Acupuncture produced greater long-term improvement in chronic prostatitis symptoms (pain, urinary function, QoL) than placebo.

Annals of Internal Medicine

ORIGINAL RESEARCH

## Efficacy of Acupuncture for Chronic Prostatitis/Chronic Pelvic Pain Syndrome

### A Randomized Trial

Yuanjie Sun, MD\*; Yan Liu, MD\*; Baoyan Liu, MD; Kehua Zhou, MD, DPT; Zenghui Yue, MD; Wei Zhang, MD, PhD; Wenbin Fu, MD; Jun Yang, MD; Ning Li, MD; Liyun He, MD, PhD; Zhiwei Zang, MD; Tongsheng Su, MD; Jianqiao Fang, MD, PhD; Yulong Ding, MD; Zongshi Qin, MD; Hujie Song, MD; Hui Hu, MD, PhD; Hong Zhao, MD, PhD; Qian Mo, MD, PhD; Jing Zhou, MD, PhD; Jiani Wu, MD, PhD; Xiaoxu Liu, MD, PhD; Weiming Wang, MD, PhD; Ran Pang, MD, PhD; Huan Chen, MD, MSc; Xinlu Wang, MD; and Zhishun Liu, MD, PhD

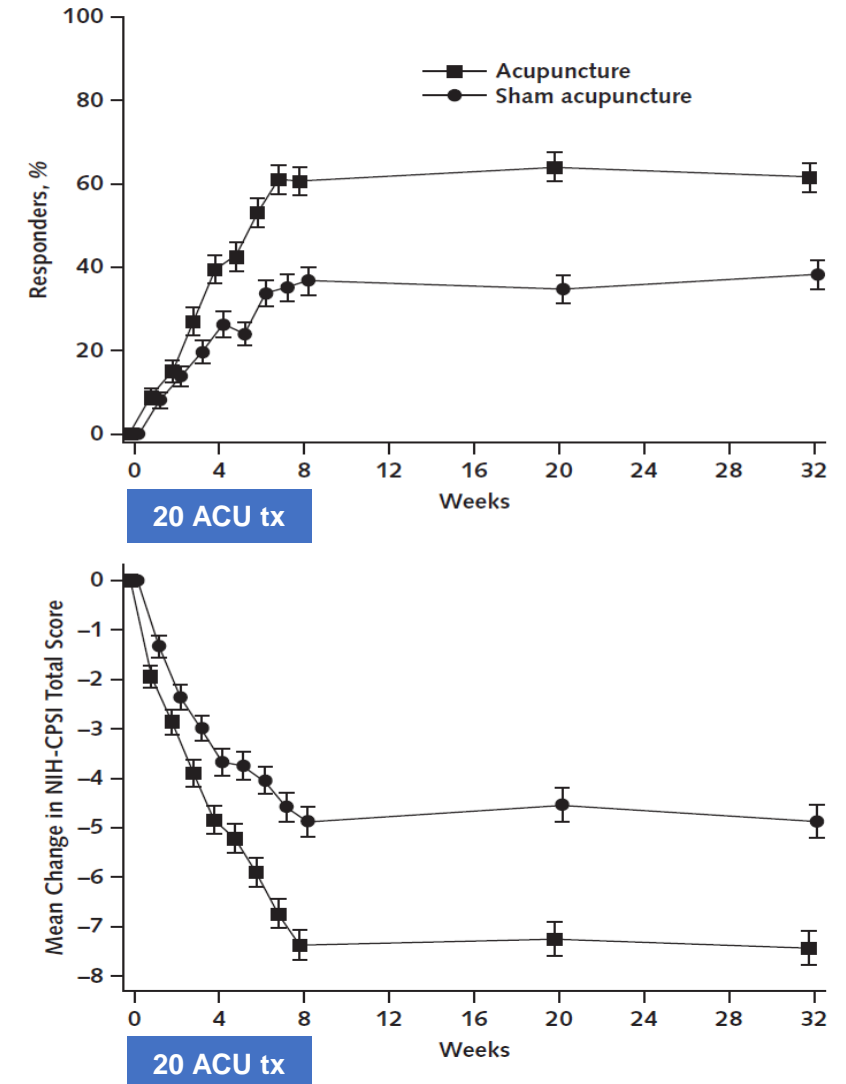
Acupuncture also produced greater improvements in IPSS and HADS scores compared to placebo.

No significant differences in sexual function (IIEF-5) or in peak and average urinary flow rates.

Twenty (9.1%) adverse events occurred in the acupuncture group, and 14 (6.4%) occurred in the placebo group.

No serious adverse events were reported.

Figure 2. Response on the NIH-CPSI over time.

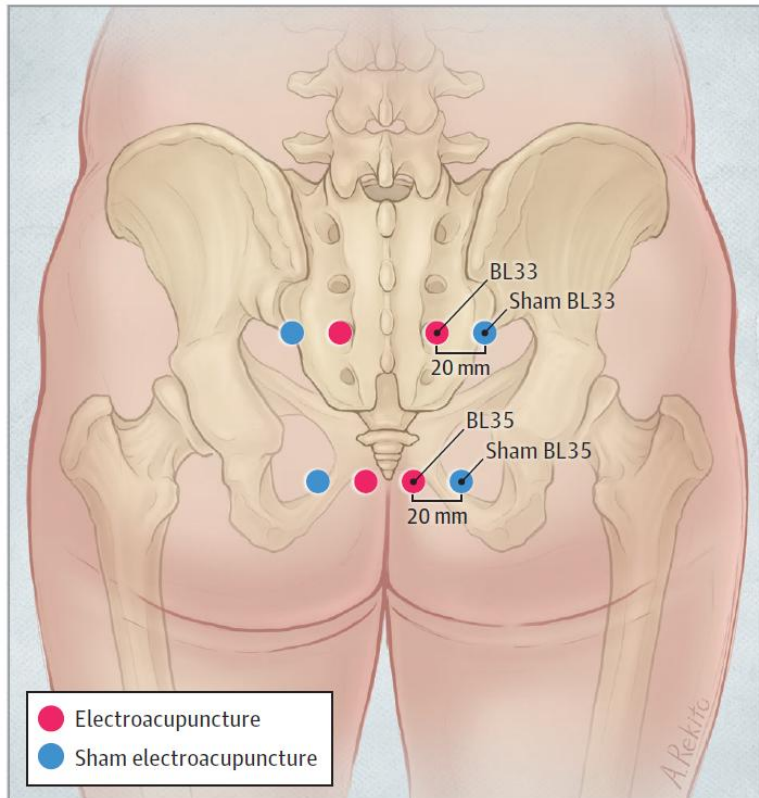


# Acupuncture reduced objective urine leakage compared to placebo.

JAMA | Original Investigation

## Effect of Electroacupuncture on Urinary Leakage Among Women With Stress Urinary Incontinence: A Randomized Clinical Trial

Zhishun Liu, MD, PhD; Yan Liu, MD; Huanfang Xu, MD, PhD; Liyun He, MD, PhD; Yuelai Chen, MD, PhD; Lixin Fu, MD, PhD; Ning Li, MD; Yonghui Lu, MD; Tongsheng Su, MD; Jianhua Sun, MD, PhD; Jie Wang, MD, PhD; Zenghui Yue, MD; Wei Zhang, MD, PhD; Jiping Zhao, MD; Zhongyu Zhou, MD; Jiani Wu, MD, PhD; Kehua Zhou, MD, DPT; Yanke Ai, PhD; Jing Zhou, MD; Ran Pang, MD, PhD; Yang Wang, MD, PhD; Zongshi Qin, MD; Shiyun Yan, PhD; Hongjiao Li, MD, PhD; Lin Luo, MD, PhD; Baoyan Liu, MD



Variable	Electroacupuncture (n = 252)	Sham Electroacupuncture (n = 252)	Difference (95% CI)	P Value <sup>a</sup>
<b>Primary Outcome</b>				
Urine leakage at wk 6, mean (95% CI), g <sup>b,c</sup>	8.2 (6.3 to 10.0)	16.8 (13.5 to 20.1)		
Change at wk 6, adjusted mean (95% CI) <sup>d</sup>	-9.9 (-12.5 to -7.3)	-2.6 (-5.2 to 0)	7.4 (4.8 to 10.0)	<.001
<b>Secondary Outcomes<sup>e</sup></b>				
Change in mean No. of 72-h incontinence episodes, adjusted mean (95% CI), wk <sup>f</sup>				
1-6	-2.9 (-3.6 to -2.2)	-2.0 (-2.7 to -1.2)	1.0 (0.2 to 1.7)	.01
15-18	-4.7 (-5.4 to -4.0)	-2.7 (-3.4 to -2.0)	2.0 (1.3 to 2.7)	<.001
27-30	-5.0 (-5.8 to -4.3)	-3.0 (-3.7 to -2.2)	2.1 (1.3 to 2.8)	<.001
Change at wk 2, urine leakage, adjusted mean (95% CI), g <sup>b</sup>	-5.8 (-8.3 to -3.2)	-2.0 (-4.6 to 0.5)	3.7 (1.5 to 6.0)	<.001 <sup>g</sup>
Reduction ≥50% at wk 6, urine leakage from baseline <sup>b</sup>	159/246 (64.6)	52/240 (21.7)	-43.0 (-50.9 to -35.0)	<.001 <sup>h</sup>
Reduction ≥50% in mean 72-h incontinence episodes from baseline <sup>h</sup>				
Weeks 1-6	91/239 (38.1)	56/243 (23.1)	-15.0 (-23.2 to -6.9)	<.001
Weeks 15-18	152/237 (64.1)	91/236 (38.6)	-25.6 (-34.3 to -16.9)	<.001
Weeks 27-30	160/237 (67.5)	99/236 (42.0)	-25.6 (-34.2 to -16.9)	<.001

# Acupuncture is a safe procedure with minimal side effects

**229,230** patients who received on average ~10 acupuncture treatments

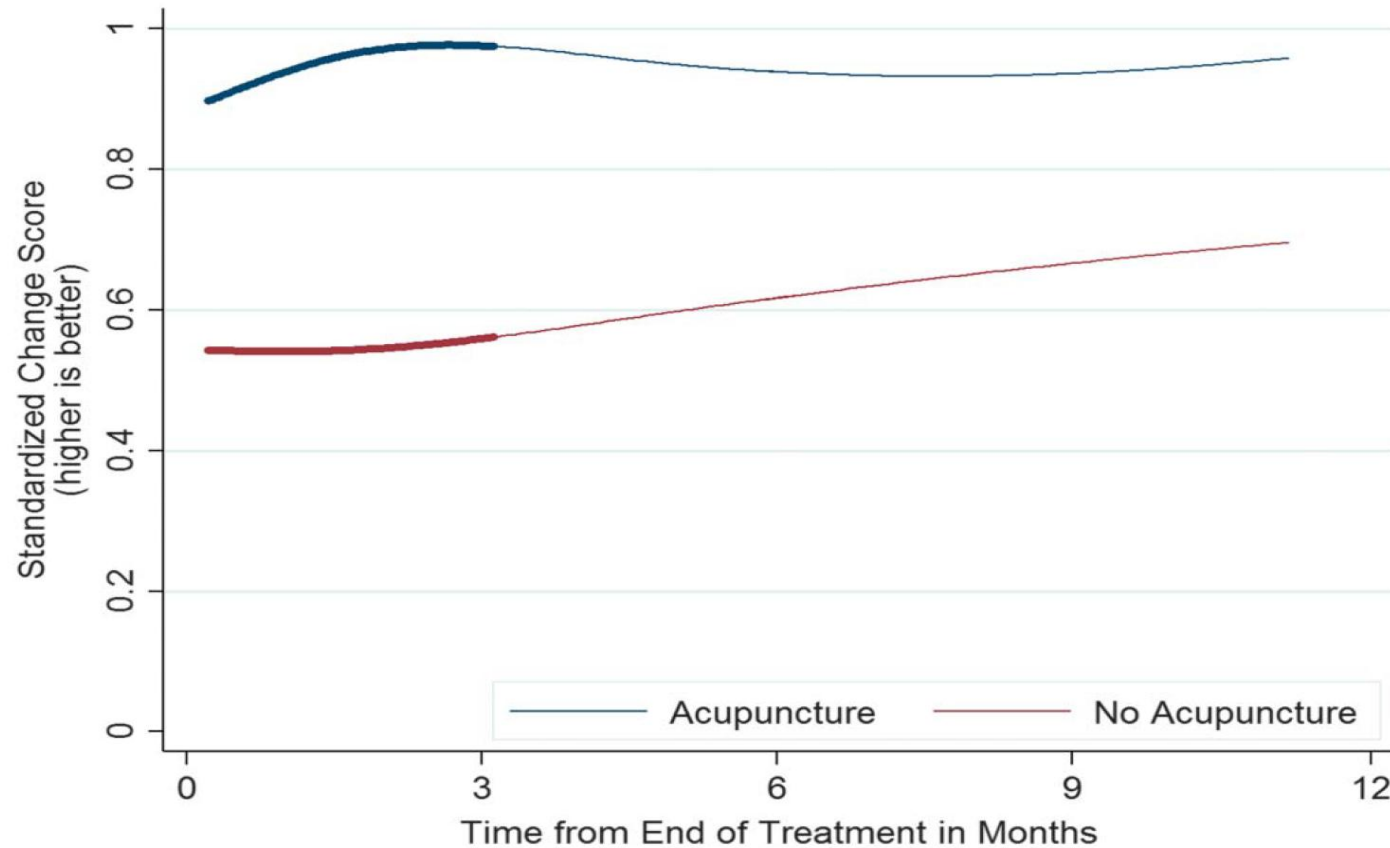
**8.6%** of patients reported adverse event

Bleeding/Bruising (6.1%)

Pain (1.7%)

Drowsiness and Vasovagal Symptoms (0.7%)

**~90% of the effects of acupuncture were sustained at 12 months relative to usual care.**



**Individual  
patient-level  
meta-analysis**

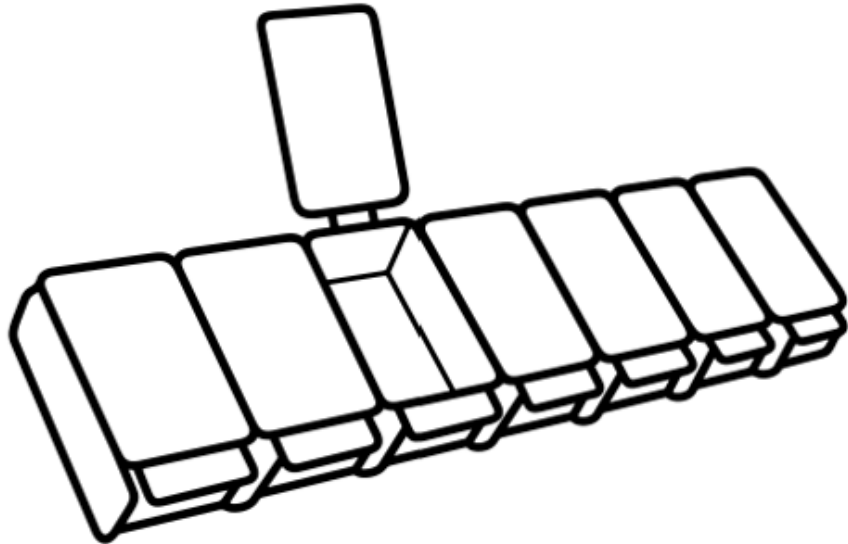
**29 RCTs  
N=17,922**

*Acupuncture effect sizes diminished by 0.011 SD every 3 months*

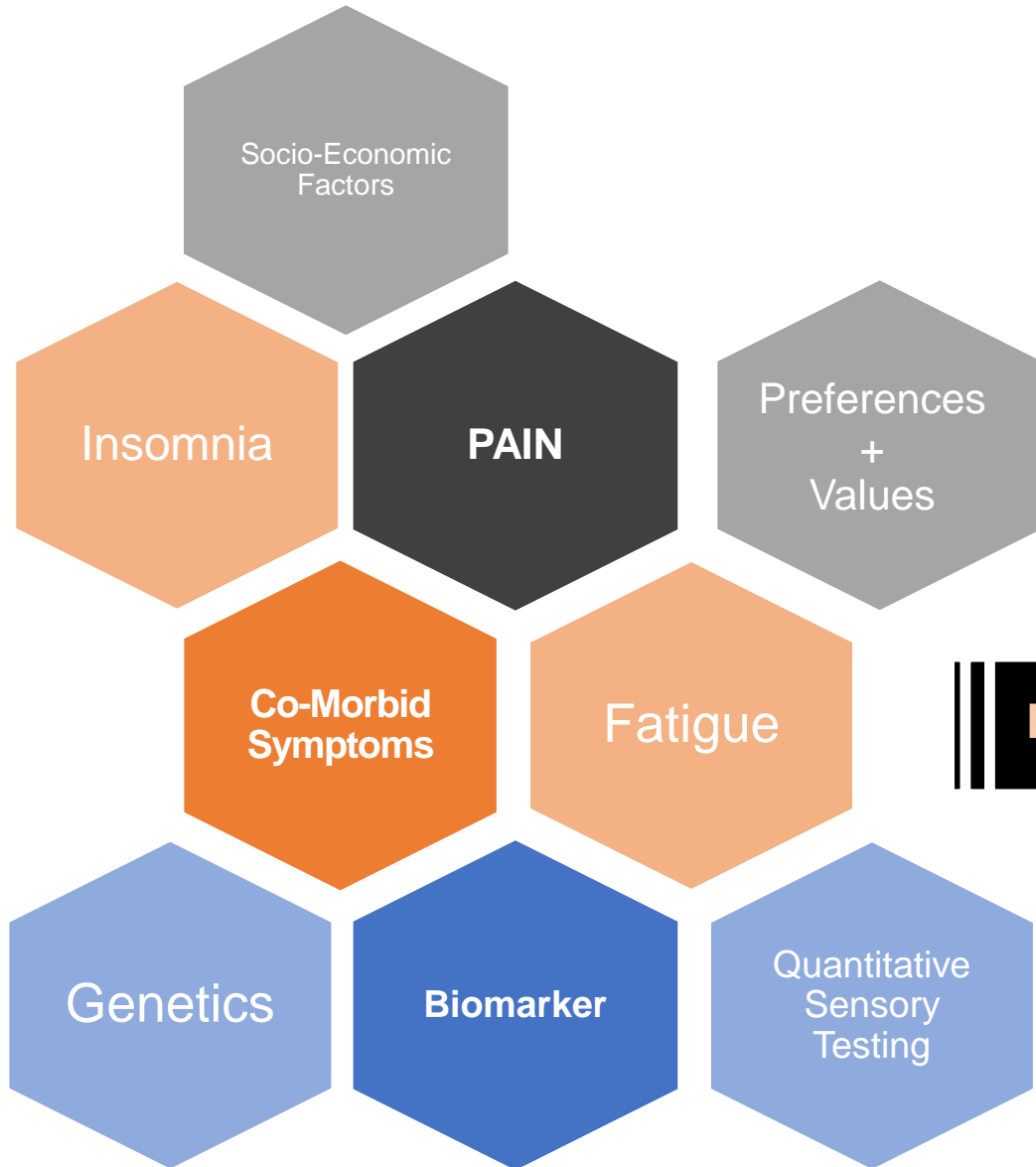
*95% CI: -0.014 to 0.037, P=0.4*

# Adequate “dosing” of acupuncture is critical for treatment response

In a meta-analysis of acupuncture for pain, ≥6 treatments significantly associated with positive pain outcome, after adjusting for study quality



**Integrative medicine seeks to move beyond a one-size-fits-all approach towards a “precision” model tailored to the individual.**



**“Precision” Therapy**