Integrative Medicine & Health: A Multidimensional Approach to Pain Management.

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I, N. Anton Borja,
DO NOT have a financial interest/arrangement or affiliation with one or more organizations that could be perceived as a real or apparent conflict of interest in the context of the subject of this presentation.

Financial Disclosure
Learning Objectives

- Discuss the rationale for recommending Integrative medicine therapies in pain management.
- Summarize the Mechanotransduction theory and the role fibroblasts play in Acupuncture treatment.
- Examine the evidence behind 3 Integrative medicine therapies used to treat pain.
- *Breath & Smile!*
breathe and smile
What’s in a name?

- **Conventional medicine:**
  - The kind of medicine most Americans still encounter in hospitals and clinics.
  - Primarily uses synthetic drugs, and surgery to treat symptoms and diseases.

- **Alternative medicine:**
  - Using a non-mainstream approach instead of conventional medicine (*NIH*).
What’s in a name?

Complementary medicine:

Using a non-mainstream approach together with conventional medicine (NIH).
Integrative medicine is healing-oriented medicine that takes account of the whole person (mental, physical, spiritual, community, socio-economic status, etc.) including all aspects of lifestyle.

- Emphasizes the therapeutic relationship between practitioner and patient.

- Informed by evidence, and makes use of all appropriate therapies both conventional and complementary.
Integrative Medicine & Health

- Integrative medicine neither rejects conventional medicine nor accepts alternative therapies uncritically.
- Good medicine is based on good science; inquiry-driven and open to new (and old) modalities.
- Effective interventions that are natural, less invasive, and more cost-effective should be used whenever possible.
- Health promotion and the prevention of illness are paramount.
+70 Academic medical centers and affiliate institutions

Mission: **Advance the principles and practices of Integrative healthcare within academic institutions**

- The Ohio State University
- University of Arizona
- University California Los Angeles
- University California San Francisco
- Stanford University
- Columbia University
- Harvard University
- Yale University
- George Washington University
- Boston University
- And more!
Center for Disease Control, through the National Center for Health Statistics annually conducts the **National Health Interview Survey (NHIS)**.

- Major source of information on the health of Americans.
- Every 5 years, NHIS includes questions about complementary health approaches.
Integrative & Complementary Health in the U.S.

- Key Findings from 2012 NHIS:
  - 33% of U.S. adults used Integrative & complementary health approaches.
  - 12% of U.S. children used Integrative & complementary health approaches.
  - ~$34 Billion spent out-of-pocket annually by consumers on these therapies and products.
Practitioner costs $11.9 billion

Total self care $22 billion

Total Costs $33.9 billion

National Health Expenditure Data 2007, U.S. Dept. Health & Human Services
OSU Integrative Medicine
Foundations of Integrative Therapy

Healthy Habits in a Health Habitat (H4)
OSU Integrative Medicine Modalities

- Acupuncture & Chinese Medicine
- Ayurveda
- Behavioral and mental health counseling
- Chiropractic
- Integrative medical evaluation
- Mind-Body therapies
- Nutrition counseling & dietary guidance
- Osteopathic Manual Treatments (OMT)
- Stress management
- Therapeutic massage
- Classes
OSU Integrative Medicine Hospital Consults

- Integrative Medicine consults available at The James and OSU Hospitals.
  - Physician or Nurse generated consults.
  - Monday – Friday.

- Inpatient Acupuncture, Osteopathic Manual Treatments (OMT) and Massage Therapy.

- Mind-Body practices online.

- Goal of treating symptoms and also improving clinical experience.
  - Treat pain, nausea, sleep difficulty, fatigue and other symptoms.
  - Reduce stress, depression & anxiety.

- To provide a temporary moment of relief, from anything distressing or trying - respite.
Multidimensional Approach to Treatment of Pain.
Chronic pain is associated with impairment of function and quality of life.

25.3 million American adults (11.2%) experience daily chronic pain. (NHIS, 2012)

~40 million American adults (17.6%) experience severe levels of pain. (NHIS, 2012)

Current management using pharmacotherapy, and physical therapy are frequently inadequate to manage pain.

Or pain management = narcotics = can of worms!
Integrative Medicine & Health in Pain Management

- Large body of evidence on the benefits of Integrative medicine for treatment of pain.
- 1/3 of American adults use Integrative treatments.
- Majority of these adults use these modalities to treat pain conditions.
American College of Physicians 2017 Practice Guideline for Treating Low Back Pain

**Recommendation 1:** Given that most patients with acute or subacute LBP improve over time, clinicians & patients should select nonpharmacologic treatment with *superficial heat, massage, acupuncture or spinal manipulation.*
American College of Physicians 2017 Practice Guideline for Treating Low Back Pain

- **Recommendation 2:** With chronic LBP, clinicians & patients should initially select nonpharmacologic treatment with *multidisciplinary rehabilitation, acupuncture, mindfulness based stress reduction, tai qi, yoga, motor control exercise, progressive relaxation, electromyography, biofeedback, low-level laser therapy, behavioral therapy, or spinal manipulation.*

- **Recommendation 3:** In chronic LBP with inadequate response…consider NSAIDs as first line, or tramadol or duloxetine as second–line therapy.
Clinicians should avoid prescribing costly therapies; those with substantial potential harms, such as long-term opioids.

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Multidimensional Pain Treatment
Passive vs. Active treatments

  - Almost everything we do is a passive treatment.

- Active Treatment: A patient must invest their own time, mindset and commitment to treatment:
  - Diet changes, exercise, meditation practice, involvement.
  - *Aka: Self efficacy!*
## Ethical Framework for Therapies

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Acupuncture
History of Acupuncture

- **Huang Di Nei Jing - Yellow Emperor's Classic of Internal Medicine.**
  - Written approximately 400 BCE.
- Earliest written evidence of Acupuncture.
- Attributed to Shen Nong, the father of Chinese Medicine.
History of Acupuncture

- Earliest archaeological evidence of Acupuncture are *Bian* stone needles.
  - Approximately 4000 years old.
- One of the earliest written descriptions of *Bian* stone needles are in the book: 'Commentary on the Spring and Autumn Annals', 550 BCE.
Bian Stone Needles

Bone Needle (Neolithic age) Used in daily life or for superficial surgery. They have been invented since 8000 years ago.
History of Acupuncture in the West

- Girolamo Cardarno (1508-1576) first European to write about Chinese needle therapy.
- 1800s: Interest in Acupuncture in the U.S. and Europe.
- Continued interest in Europe, but U.S. medical community lost interest.
History of Acupuncture in the U.S.

Sir William Osler

- "Father of modern medicine".
- One of four founders of Johns Hopkins Hospital.
- Physician & Acupuncturist.

Source: Courtesy of Wikimedia Commons
"In acute cases, [Acupuncture] is the most efficient treatment [for sciatica and lumbago].... I can corroborate fully... as to its extraordinary and prompt efficacy in many instances."

*The principles and practice of medicine: designed for the use of practitioners and students of medicine, 1892.*
History of Acupuncture in the U.S.

- In 1971, James Reston, a NY Times reporter, accompanied Henry Kissinger to China and developed acute appendicitis.
- Reston got an operation AND Acupuncture during his hospital stay.
- Wrote an article introducing many Americans to Acupuncture.
The Science of Acupuncture
ED'S 1 SECOND ACUPUNCTURE TREATMENT

Ready?
The Physiology of Acupuncture

- **Endorphin theory**: Releases endorphins for pain control.
- **Gate Control theory**: Increases impulses from A Beta nerve fibers block pain signals from A Delta (acute intense pain) & C (chronic throbbing pain) nerve fibers.
- **Circulation theory**: Increases constriction and/or dilation of local blood vessels.
The Physiology of Acupuncture

- Effect of Acupuncture on neurovascular bundles.
- Mechanotransduction of fibroblasts with Acupuncture.
- Segmental anatomic response to Acupuncture.
- Neuromodulation effect of Acupuncture.
What is De Qi?

- Patients receiving acupuncture experience a multi-sensation experience described as numbness, soreness, distention, heaviness, dull pain.
  - “A tooth ache” at the needling site.
- Symptomatic indicator of the acupuncture “working”.
  - Triggering neurological and other physiological responses within the body.
Effect of Acupuncture on Neurovascular Bundles
Neurovascular bundle

- Grouping of nerve and blood vessels.
- Often the nerves are responsible for dilation of blood vessels.
- A term applied to the body nerves, arteries, veins and lymphatics that tend to travel together in the body.
Effect of acupuncture on neurovascular bundles

- Acupuncture activates thin nerve fibers which release vasoactive neuropeptides and nitric oxide from their peripheral terminals.
- Activation leads to vasodilatation and increased blood flow.
Mechanotransduction of Fibroblasts with Acupuncture
Mechanotransduction of Fibroblasts with Acupuncture

- Fibroblasts play a major role in the response to acute injury.

- Chronic inflammation causes fibroblasts to increase deposition of collagen.
  - > collagen > tissue tension > contractures that restrict range of motion > pain.

- Acupuncture, yoga and manual therapy causes elongation of fibroblasts.
Mechanotransduction of fibroblasts with acupuncture

- Stimulation of protein Rho pathway signals ATP release.
- ATP changes cell shape causing relaxation of connective tissue. Breakdown ATP products also may have analgesic effects.

ACUPUNCTURE
Connective tissue spools around a twisting acupuncture needle, creating a localized stretch.

FIBROBLAST
Attachment to extracellular matrix released

Relaxation of tissue

Tissue stretch

Focal adhesion complex

Putative analgesic effects

ATP release

Rho signaling

Remodeling of focal adhesions

Cytoskeleton

copyright Tolpa Studios, used with permission.
Segmental Anatomic Response to Acupuncture
GERAC

- German Acupuncture Studies on Chronic Low Back pain (GERAC) 2007.
- Double-blinded randomized trial of 1162 patients with chronic low back pain.
- Verum (true) acupuncture vs. Sham acupuncture vs. conventional care (drugs, Physical Therapy, exercise).
- Primary outcome: Response at 6 mos. defined as 33% improvement or better on 3 pain-related items on the Von Korff Chronic Pain Grade Scale.
GERAC Results

- Response rate: 47.6% verum group, 44.2% sham group, and 27.4% conventional group.
- Effectiveness of acupuncture, either verum or sham, was almost twice that of conventional therapy.
- 3.4% difference between verum and sham.
- Why?
Segmental Anatomic Response to Acupuncture

- Dermatome: area of skin innervated by a single spinal nerve.
- Myotome: muscles that a single spinal nerve innervates
- Segmental anatomy include:
  - Spinal nerve
  - Sympathetic/parasympathetic nerves
  - Viscerotome & Sclerotome & Myotome & Dermatome
- Spinal nerves relay sensation (ie. pain) from a region of skin and muscle to the brain.
Segmental Anatomic Response to Acupuncture

- Acupuncture usually hits one dermatome and one or more myotomes.
- This initiates a process of autoregulation.
Segmental Anatomic Response to Acupuncture

- An acupuncture needle penetrating the skin will stimulate the segmental anatomic response.
- Creates a neurological response which can improve symptoms, such as decreasing pain.
Is there ‘real’ Acupuncture?

- There is no placebo in acupuncture other than a deactivated laser in some distance to the skin.
- Any kind of acupuncture that touches the skin has a certain effect.
Neuromodulation effect of Acupuncture
Neural Mechanisms of Acupuncture as revealed by fMRI

- Acupuncture evokes brain activation in sensorimotor areas & deactivation in limbic-paralimbic network.
- Modulates connectivity in several areas of the brain associated with emotions, memory, sensory processing, pain-blocking, autonomic response and affective brain regions.
Neuromodulation effect of Acupuncture

- Acupuncture may achieve differential brain modulations & bear the corresponding therapeutic effects through dynamic reconfiguration of the neural networks.

Ctrl+Alt+Del
The Research Behind Acupuncture
Acupuncture: World Health Organization

- Conditions for which acupuncture has been proved through controlled trials to be an effective treatment:
  - +Adverse reactions to radiotherapy and/or chemotherapy +Allergic rhinitis + Biliary colic
  - +Depression +Dysentery, acute bacillary
  - +Dysmenorrhea +Acute epigastric pain(peptic ulcer, acute and chronic gastritis) +Facial pain +Headache
  - +Hypertension +Essential Hypotension +Primary Induction of labor +Knee pain +Leukopenia.
Acupuncture: World Health Organization

- Low back pain
- Malposition of fetus
- Morning sickness
- Nausea and vomiting
- Neck pain
- Pain in dentistry (dental pain and temporomandibular dysfunction)
- Arthritis of shoulder
- Postoperative pain
- Renal colic
- Rheumatoid arthritis
- Sciatica
- Sprain
- Tennis elbow.
Acupuncture: World Health Organization

- Conditions which the therapeutic effect of acupuncture has been shown but further evidence is needed.
  - >70 conditions

- Conditions for which there are only individual controlled trials reporting some therapeutic effects, but for which acupuncture is worth trying because treatment by conventional and other therapies is difficult.
  - >10 conditions
Acupuncture: Cochrane Summaries

- **Migraines**: Acupuncture is at least as effective as, or possibly more effective than, prophylactic drug treatment, and has fewer adverse effects.

- **Osteoarthritis**: Trials of Acupuncture for peripheral joint osteoarthritis suggest statistically significant and clinically relevant benefits.
Acupuncture: Cochrane Summaries

- **Tension Headaches**: Acupuncture could be a valuable non-pharmacological tool in patients with frequent episodic or chronic tension-type headaches.

- **Neck pain**: Moderate evidence that those who received acupuncture reported less pain at short term follow-up than those on a waiting list.

- Acupuncture Trialists’ Collaboration, meta-analysis of 17,922 patients.
- Investigated use of Acupuncture for back and neck pain, osteoarthritis, shoulder pain, or chronic headache.
- Statistically significant differences between acupuncture versus a no-acupuncture controls.

“Provides the most robust evidence to date that acupuncture is more than just placebo and a reasonable referral option for patients with chronic pain.”

Acupuncture versus Morphine in ED, 2016.

- 300 patients in an Emergency Department
- Primary outcome: measure the degree of pain relief (>50% pain reduction from baseline) in 60 minutes.
  - Acupuncture treatment based on predetermined protocols.
  - 0.1 mg/kg morphine starting dose, and titrated 0.005 mg/kg q 5 minutes until outcome reached. 15 mg morphine max.
Acupuncture versus Morphine in ED, 2016.

- 92% success rate in acupuncture group versus 78% morphine group.

- Resolution time:
  - Acupuncture (16+/− 8 mins) vs Morphine (28 +/- 14 mins).

- Adverse effects:
  - Acupuncture (4 pts) vs Morphine (85 pts- dizziness).

Manual Therapies
Manual Therapies

- Osteopathic Manual Treatments (OMT)
- Chiropractic Manipulation
- Massage Therapy
- Traditional Asian Medicine: Tuina, Acupressure
- Therapeutic Touch/Reiki
- Reflexology
The Importance of Touch on Development

- Touch is an important modality for growth and development.

- Positive effects of mechanosensory stimulation have been demonstrated in a wide range of organisms: worm larvae, rat pups, and human infants.

- Developmental delay is often seen in children receiving inadequate or inappropriate sensory stimulation.

Manual Therapies: Cochrane Summaries

- Spinal Manipulative Therapy (SMT) for chronic low-back pain: as effective as other therapies for chronic back pain, such as, standard care, PT, exercise therapy. Rubenstein, et al. 16 February 2011.


Not good manual therapy.
Mind Body Practices

OSU Integrative Medicine
Multidimensional Pain Treatment

Movement
Acupuncture
Mind-Body Practices
Manual Therapies

Family
Food
Medicine - Supplements
Meditate - Pray

YOU
Mind Body Practices

- Mind body practices focus on the interactions among the brain, mind, body and behavior. (NIH)

- Types of Mind Body Practices:
  - Biofeedback
  - Cognitive Behavioral Therapy
  - Creative or expressive arts therapies
  - Guided imagery
  - Meditation
  - Mindfulness
  - Prayer
  - Many more..
Patients with depression &/or anxiety with more severe symptoms have more disabling pain than persons without a depressive or anxiety disorder.

Mindfulness Based Stress Reduction & Cognitive Therapy

- Studies indicate that Mindfulness Based Stress Reduction (MBSR) and Mindfulness Based Cognitive Therapy (MBCT) have broad-spectrum antidepressant and anti-anxiety effects and decrease general psychological distress.


  Where there is peace and meditation, there is neither anxiety nor doubt.
  St. Francis de Sales
Behavioral treatment for Chronic low back pain: There is moderate evidence that in the short term patients with chronic LBP can benefit from the following therapies:

- Operant - acknowledge external factors associated with pain can reinforce it.
- Cognitive - dealing with thoughts, feelings, beliefs, or a combo of the three, that trigger the pain.
- Respondent - interrupts muscle tension with progressive relaxation techniques or biofeedback.

Henschke N. et al. 7 July 2010.
Multidimensional Treatment

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Multidimensional Pain Treatment

THE OHIO STATE UNIVERSITY
WEXNER MEDICAL CENTER
Multidimensional Treatment

Integrative Health

- 30 min focused attention meditation AND
- 30 min mod-intensity aerobic exercise

Mental and Physical Training (MAP)

- 22 patients with MDD.
- 30 patients non-depressed.
- 40% reduction in depression symptoms in patients with MDD.
- Non-depressed pts felt happier!

Translational Psychiatry (2016) 6, e726; doi:10.1038/tp.2015.225
Published online 2 February 2016
Multidimensional Treatment

Acupuncture & Counseling in Depression

Randomized controlled trial of acupuncture and counseling for patients presenting with depression, both interventions were associated with significantly reduced depression at 3 months when compared to usual care alone.

Tai Qi
Randomized Control Trial: Tai Qi

- 44% reduction in pain and other symptoms in tai qi group versus no change in control group.
Balneotherapy

- The treatment of conditions through the use of hot or cold mineral baths.

- Latin: Balneum, “bath”.

- Ancient treatment, and one of the longest utilized.
Balneotherapy: Cochrane Summaries

- Spending time in a mineral bath compared to no treatment may improve pain and quality of life.
- Spending time in both a sulfur bath and a dead sea bath compared to no treatment may improve pain one month after treatment.

A predominantly plant-based diet such as the Mediterranean diet has an anti-inflammatory effect on the body.

The Mediterranean diet has been shown to decrease the risk of cardiovascular disease and primary heart attack.

Can an anti-inflammatory diet decrease pain?
Higher body fat was associated with self-reports of greater pain, and dietary practices consistent with better health and anti-inflammatory effects were associated with lower self-reported pain.

“If you have a good diet, you do not need acupuncture or herbs.”

“If you have a bad diet, you do not need acupuncture or herbs.”
OSU Integrative Medicine

It's NOT magic! there are no magic pills.

"You gotta be kidding! Your back still hurts?!"
Final Thoughts

- Integrative Medicine is not fringe medicine, it is a new paradigm which is patient-centric, can improve current medical practice, improve patient care, and has strong patient interest.

- A Multi-dimensional approach to pain can be effective for pain control and is a safer approach for patients.

- An Integrative Medicine & Health approach would incorporate therapies like: acupuncture, manual therapies, mind-body practices, medication/supplements, exercise, nutrition and lifestyle changes.
For More Information

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References

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Thank You

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