DOES COMPLIMENTARY and ALTERNATIVE MEDICINE (CAM) HAVE a ROLE IN SPORTS MEDICINE PRACTICE?

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What ARE Complementary & Alternative Medicine (CAM)

- **Allopathic**
  - Conventional of mainstream medicine

- **Complementary medicine**
  - Medical practices outside of mainstream medicine used in conjunction with conventional medicine

- **Alternative medicine**
  - Medical practices outside of mainstream medicine used without any additional conventional medicine

- **Integrative medicine**
  - The blending of conventional and complementary medicine

https://nccih.nih.gov/health/integrative-health
Five (5) Domains

Alternative Medical Systems

Mind-body Interventions or techniques (facilitates mind’s effect on bodily functions and symptoms)

Biologically-based systems (such as herbalism)

Manipulative and body based methods (chiropractic, massage therapy)

Energy Therapies

Mind Body Practices

- Yoga
- Chiropractic
- Osteopathic manipulation
- Meditation
- Massage therapy
- Tai chi
- Qigong; Qi gong; Chi Kung/Gung
- Healing touch
- Hypnotherapy

- Relaxation Techniques
  - Breathing exercises
  - Guided imagery
  - Progressive muscle relaxation

- Movement Therapies
  - Feldenkrais method
  - Alexander techniques
  - Pilates
  - Rolfing Structural Integration
  - Trager psychophysical integration
Institutes
CONSCIOUSNESS AND HEALING INITIATIVE

http://www.chi.is/indexhome
Chopra Foundation

https://www.choprafoundation.org/
UCLA Center for East-West Medicine

http://cewm.med.ucla.edu/

http://www.noetic.org/
Sara Lazar, Ph.D.
Neuroscience of Yoga and Meditation
Neuroscience of Yoga and Meditation

http://scholar.harvard.edu/sara_lazar
Boston University School of Medicine
Integrative Medicine

Program for Integrative Medicine & Health Care Disparities

http://www.bumc.bu.edu/integrativemed/
Department of Medicine, Division of Preventive and Behavior Medicine

http://www.umassmed.edu/cfm/
Katherine A. Gallagher
Integrative Therapies Program

Acupuncture
Art Therapy
Massage Therapy
Music Therapy
Chigong
Tai Chi

Benson-Henry Institute for Mind Body Medicine

http://www.massgeneral.org/cancer/supportservices/integrative.aspx
JOURNALS
The Journal of Alternative and Complementary Medicine
  http://www.liebertpub.com/acm

Evidence Based Complimentary and Alternative Medicine (2015 Impact Factor 1.931)
  https://www.hindawi.com/journals/ecam/

Complimentary Therapies in Medicine
  http://www.journals.elsevier.com/complementary-therapies-in-medicine

Journal of Traditional and Complementary Medicine
  http://www.journals.elsevier.com/journal-of-traditional-and-complementary-medicine/
Asian Journal of Complementary and Alternative Medicine

BioMed Central Complementary and Alternative Medicine
https://bmccomplementalternmed.biomedcentral.com/
(Impact factor 1.375)

Global Advances in Health and Medicine
http://www.gahmj.com/
MECHANISMS
Familiar Aspects of Medicine

http://www.webmd.boot.com/pain-management/guide/shoulder-pain


http://www.onehealth.co.uk/orthopaedics-procedures-tendonitis
Forgotten Aspects of Medicine

Forms of Energy

- **Kinetic Energy**: energy of movement
- **Potential Energy**: stored energy
- **Energy**: can be
- **Energy comes from moving**: we experience energy in different ways
- **Energy is stored to be used later**: we experience energy in different ways

**Thermal Energy**: energy of moving particles (heat)
**Mechanical Energy**: energy of objects in motion
**Electrical Energy**: energy of particles moving through a wire
**Magnetic Energy**: energy causing push or pull

**Sound Energy**: form of energy we can hear
**Light Energy**: form of energy our eyes can detect

**Chemical Energy**: energy stored in food, fuel
**Elastic Energy**: energy stored in objects that are stretched
**Nuclear Energy**: energy stored in the centre of particles
**Gravitational Energy**: energy stored in an object when it is above the earth's surface

Comfort Level....
Energy Medicine
Comfort Level.....
Mechanism(s)

- Information Delivery
  - Electrical
  - Hormonal
- Information Delivery System
  - Nervous system (sympathetic, parasympathetic, enteric)
- Information Receivers
  - Receptors
The Body’s Communication

- Nervous system
  - Autonomic
    - Sympathetic & parasympathetic & enteric
- Communicate through receptors
  - Eyes, ears, nose, tongue, skin
- Receptors communicate
  - Mechanically
  - Chemically
  - All of which create or redistribute energy....
- Transportation systems - microtubules....
Saltatory Conduction in Myelinated Axons

Myelin sheathing has bare patches of axon called **nodes of Ranvier**

Action potentials jump from node to node

Fig. 48.11

https://www.youtube.com/watch?v=qDUjVzVq7xE
Nervous System Communication

**A**

![Diagram of RMP and Cell membrane]

**B**

Depolarization:
- Threshold (-55mV)
- Na+ (+30mV)

**C**

Propagation:
- +30mV
- (100 m/s or 225 mph)
- Na+

**D**

Repolarization:
- -70mV
- K+

**E**

Na+ K+ Pump:
- -70mV
- K+
- Na+
Hormonal Communication

The activation of the stress system

- Hypothalamus
- Nerve impulses
- Adrenal gland
- Catecholamines
- Blood vessel
- Increased heart rate
- Liver converts glycogen to glucose
- Decreased digestive system activity
- High blood pressure
- Dilution of bile salts
Overview of sites of thyroid hormone regulation of metabolism.
RECEPTORS

https://dtc.ucsf.edu/types-of-diabetes/type1/understanding-type-1-diabetes/how-the-body-processes-sugar/blood-sugar-other-hormones/
Cell Membrane ~ Protein Functions

http://www.proteinatlas.org/humanproteome/secretome
Body Activity Taken for Granted
TOUCH RECEPTORS

Sensory Receptors in Skin

- Free nerve ending
- Root hair plexus
- Meissner's corpuscle
- Pacinian corpuscle
- Organ of Ruffini
EAR RECEPTORS

Semicircular canal
Endolymph
Cupula
Hair cell
Cristae
Vestibular nerve
Ampulla
Cupula
Sterocilia
Support cells
Afferents of the vestibular nerve

Ampulla
Kinocilium
Endolymph

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SMELL RECEPTORS

Axon of olfactory nerve
Cribriform plate
Lamina propria
Basal cell
Supporting cell
Receptor cell
Cilia of receptor cell
Mucus layer

Nasal cavity
Cribriform plate
Olfactory bulb
Bowman’s gland
Olfactory epithelium
Olfactory epithelium

http://droualb.faculty.mjc.edu/Course%20Materials/Physiology%20101/Chapter%20Notes/Fall%202011/chapter_10%20Fall%202011.htm
© 2011 Pearson Education, Inc.
TASTE RECEPTORS

(a) Dorsum of tongue showing location of papillae and taste zones
- Epiglottis
- Root of tongue
- Palatine tonsil
- Lingual tonsil
- Circumvallate papilla
- Fungiform papilla
- Filiform papilla

(b) Details of papillae
- Circumvallate papilla
- Filiform papilla
- Fungiform papilla
- Taste bud

(c) Structure of a taste bud
- Gustatory hair
- Gustatory receptor cell
- Stratified squamous epithelium
- Supporting cell
- Connective tissue
- Basal cell
- Sensory neurons
Nervous System

Voluntary

Involuntary ~ Autonomic
AUTONOMIC NERVOUS SYSTEMS

PARASYMPATHETIC NERVES
“Rest and digest”
- Constrict pupils
- Stimulate saliva
- Slow heartbeat
- Constrict airways
- Stimulate activity of stomach
- Inhibit release of glucose; stimulate gallbladder
- Stimulate activity of intestines
- Contract bladder
- Promote erection of genitals

SYMPATHETIC NERVES
“Fight or flight”
- Dilate pupils
- Inhibit salivation
- Increase heartbeat
- Relax airways
- Inhibit activity of stomach
- Stimulate release of glucose; inhibit gallbladder
- Inhibit activity of intestines
- Secrete epinephrine and norepinephrine
- Relax bladder
- Promote ejaculation and vaginal contraction

Figure 45-20 Biological Science, 2/e
© 2005 Pearson Prentice Hall, Inc.
Two brains in one body

The enteric nervous system in the gut, or "second brain," shares many features with the brain in your head. It can act autonomously and even influence behavior by sending messages up the vagus nerve to the brain.

- **Brain**
- **GUT (ENS)**

**Brain**
- 85 million neurons
- 100 neurotransmitters identified
- Produces 50% of all dopamine
- Produces 50% of all serotonin
- Barrier restricts blood flow to brain

**Second Brain**
- 500 million neurons
- 40 neurotransmitters identified
- Produces 50% of all dopamine
- Produces 95% of all serotonin
- Barrier restricts blood flow to second brain

**TWO CONTROL SYSTEMS**

- Brain
- GUT (ENS)
Woo ~Woo??

Electrical Energy

Chemical/Hormonal Energy

Autonomic Nervous System (3)

Receptors
Complimentary and Alternative Medicine in Sports Medicine

- Not much out there....
- Pain Management
- Anxiety Management
- Cancer Care
Possible Modalities

- Acupuncture
- Cupping
- Gua Sha
- Fascial
  - Tensegrity
- Mindfulness & Meditation
- Breathing
- Yoga
- Feldenkrais & Alexander Techniques
  - Motor Learning
Selected Outcome Measures

- Pain
- ROM
- Functional movement
- Performance
- Balance
- Whole person health
- Performance of the overall system
  - Quality of Life
  - Easier to sleep
  - Feel less tension
  - Hurts less
Acupuncture vs Dry Needling

**Acupuncture**
- Balance the energy flow within the body
- Open up the channels of the body meridians (5)
- Needle inserted into a meridian point
- The body will heal itself
- Medical Acupuncture (MD, DO)

**Dry Needling**
- Orthopedic in Nature
- Focuses on Trigger Points
- Needle inserted into the trigger point of the muscle
Dry Needling Technique
Dry Needling Mechanism

Needle disrupts the structural integrity of the muscle fiber and end plate.
Acupuncture Meridians

Acupuncture Meridian & Organ Networks

Symptoms of a Primary and Minor Meridian imbalance:
- Headache
- Insomnia
- Fatigue
- Nausea
- Diarrhea

Symptoms of a Heart and Small Intestine Meridian imbalance:
- Chest pain
- shortness of breath
- Heartburn

Symptoms of a Spleen and Stomach Meridian imbalance:
- Appetite loss
- Nausea
- Vomiting

Symptoms of a Liver and Gallbladder Meridian imbalance:
- Headache
- Dizziness
- Nausea
- Vomiting

Symptoms of a Kidney and Bladder Meridian imbalance:
- Urinary frequency
- Urinary incontinence

How Qi Flows within the Body

https://www.youtube.com/watch?v=Lnc4jp0y3uc
Mechanism

- No Consensus
- Animal Models
  - Release of endogenous opiates
  - Release of serotonin
  - Influence on receptors to excitatory amino acids at the spinal cord level
- Regulation of the immune system through the autonomic nervous system

Mechanisms

- Local
  - Pain relief through neuropeptides

- Spinal
  - Gate control

- Supraspinal mechanisms
  - Descending pain inhibitory system through the sympathetic nervous system

- Cortical
  - Possibly placebo

Mechanism

- **Vagus Nerve (autonomic nervous system)**
  - Anti-inflammatory: regulation of the inflammatory response
  - Protein regulation
  - Positively influences splenic tumor necrosis factor (alpha)

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Transport Mechanism: Microtubule

https://online.science.psu.edu/biol011_active002/node/4184
CUPPING

- Heat the air inside the cup
- Cooling of the air creates suction
- Blood vessels expand ~ redness

Olympic Pseudo-Science

http://www.blackchiropractic.org/ba-guan-ancient-chinese-therapy/
Efficacy ~ Multiple Applications...

- **Pain ~ no consensus**

- **Neck Pain ~ no consensus**

- **Potential Benefits**
Gua Sha

- An instrument-assisted unidirectional press-stroking of a lubricated area of the body surface to intentionally create transitory therapeutic petechiae called ‘sha’ representing extravasation of blood in the subcutis.

Science of Gua Sha

 Outcome
  ▶ Increase in micro-perfusion
  ▶ Anti-inflammatory
    ▶ Heme-oxygenase-1
  ▶ Immune effect
  ▶ Effects pain, stiffness, fever, chill, cough, wheeze, nausea, etc.
  ▶ Effects acute and chronic internal organ disorders


Add strain to the system and the deformation gets distributed across the structure

In the body – pain – break down at the weakest link

Structural Basis of Life

https://www.anatomytrains.com/fascia/tensegrity/
RESO URC ES (soft tissue)

- Tensegrity
- Strolling Under the Skin
  - https://www.youtube.com/watch?v=eW0lvOVKdxE&feature=youtube
Mindfulness / Meditation

- Alterations in Brain Function (cognition)
  - Brain Changes = NEUROPLASTICITY
  - Changes Neurobiology

- Alterations in Brain and Immune Function
  - doi: 10.1097/01.PSY.000077505.67574.E3
  - Jon Kabat-Zinn ~
    http://www.umassmed.edu/cfm/
Neuroplasticity

SPECT Images at Baseline and During Meditation

Baseline

Meditation

Orientation Area

Orientation Area

http://www.andrewnewberg.com/research/
Meditation & Telomeres


Alteration in Gene Expression

Telomerase Activity
doi:10.1038/tp.2016.164
Telomeres

- **Telomeres protect the ends of the DNA**
- **When telomeres are lost**
  It leaves the DNA unprotected against change
- **Broken DNA is dangerous** (*changes gene expression*)

Meditation vs Vacation Effect

- Improvements in Cellular Health (identified by blood markers)
  - Improved regulation of stress response
  - Improved regulation of immune function
  - Improved regulation of amyloid beta metabolism (amino acid involved with Alzheimer's; amyloid plaques)

- doi:10.1038/tp.2016.164
Mindfulness ~ Meditation

- Increase in Grey Matter
  - Increase in Learning & Memory Processes
  - Improved Emotional Processing
  - doi:10.1016/j.pscychresns.2010.08.006
- Results in Functional and Structural Plasticity
  - doi:10.1093/scan/nss056
Other Considerations
Other Consideration

- Breathing
- Yoga
- Imagery (Motor Learning Literature)
- Systemic effect of Emotional Chemistry
- Role of Micro-Biomes
  - Autism and Autism Spectrum
    - [http://dx.doi.org/10.1016/j.cell.2013.11.035](http://dx.doi.org/10.1016/j.cell.2013.11.035)
- Obesity
- Cancer
- Role of the western diet......
Other Considerations

- Epigenetics vs Genetics (5%)
- Role of Inflammation
  - Heart Disease
  - Cancer
  - Obesity
  - Alzheimer’s
- Whole Body Interventions
The Challenge...

Identifying the Mechanisms...
Integrated Medicine

Person as a kinetic chain